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# NEWS RELEASE

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
1520 H STREET, NORTHWEST · WASHINGTON 25, D. C.
TELEPHONES: DUDLEY 2-6325 · EXECUTIVE 3-3260

RELEASE NO. 61-116

FOR RELEASE: Thursday PM's
June 1, 1961

## SATURN CONFIGURATION TO BE CHANGED

Modifications in the configuration of the Saturn launch vehicle were announced today by the National Aeronautics and Space Administration.

A two-stage Saturn C-1 will be used for the first ten research and development flights instead of the three stages originally planned. In the first several flights, however, a dummy third stage will be added for aerodynamic stability. The vehicle will be about 160 feet high.

Primary purpose of the first ten flights of Saturn, under development by NASA's Marshall Space Flight Center, is to test the vehicle. On the last four of the Saturn C-1 flights, as a secondary mission, early boilerplate models of the Apollo spacecraft may be placed in earth orbit. It has been determined that a two-stage Saturn C-1 will be able to accomplish the Apollo earth orbital mission.

The payload capability for a two-stage Saturn C-1 will be about 20,000 pounds in low earth orbit -- approximately the same as the original three-stage configuration.

This is because of two recent modifications in the program:

1. The increased thrust of the second (S-IV) stage from 70,000 pounds to 90,000 pounds by the addition of two engines (NASA Release No. 61-71, April 7, 1961).

2. A planned increase in the propellant capacity of the booster (S-I) beginning with the seventh flight of the C-1.

The present schedule calls for the first three C-1 vehicles to consist of live booster stages with dummy second and third stages. The next three vehicles will include only two stages -- both live -- S-I and S-IV.

In the seventh through the tenth flights, which will launch the test Apollo models, the S-I and S-IV stages will be live but the vehicle will be shortened to about 150 feet because of a shorter instrument compartment-payload adapter section.

Also in the seventh through tenth flights, the tankage of the S-I stage will be lengthened from 50 to 56 feet, increasing burning time by adding some 100,000 pounds of propellant for a total of 850,000 pounds. These flights also will be the first to use H-1 engines rated at their full thrust of 188,000 pounds each.

Because of their shorter length, these C-1's will have aerodynamic fins attached to the booster's tail section for increased stability and control.

The original third stage (S-V) will not be used until later in the C-1 program and for some flights of the advanced Saturn C-2 configuration.

While no major S-V stage development program is called for under this ten-vehicle plan, a limited engineering effort will continue to adapt the Centaur stage for the later C-1 and C-2 flights. S-V is being developed by the Astronautics Division of General Dynamics Corp. It is powered by two LR-115 Pratt and Whitney engines of 15,000 pounds thrust each.

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# NEWS RELEASE

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
1520 H STREET, NORTHWEST · WASHINGTON 25, D. C.
TELEPHONES: DUDLEY 2-6325 · EXECUTIVE 3-3260

FOR RELEASE: Thursday, Noon
June 1, 1961

RELEASE NO. 61-117

Joint Release of National Aeronautics and Space Administration and Atomic Energy Commission.

## AEC-NASA ANNOUNCE PLANS FOR KIWI-B REACTOR TEST AT NEVADA TEST SITE

The Atomic Energy Commission and the National Aeronautics and Space Administration have announced that the first of a series of Kiwi-B experimental reactors is scheduled to be ground tested in the fall at the Commission's Nevada Test Site. This test will mark the start of a new accelerated testing phase in the nuclear rocket propulsion program known as Project Rover. Facilities now under construction in the Jackass Flats area of the Nevada Test Site will permit power runs approximately every two months during 1962.

The Nuclear Rocket program is a joint effort of the Atomic Energy Commission and the National Aeronautics and Space Administration. The Los Alamos Scientific Laboratory, operated for the Commission by the University of California, is responsible for developing the Kiwi reactors. An industrial contractor is in the process of being selected to design and develop a nuclear rocket engine (NERVA) using the technology developed by Los Alamos. The promise of such systems was displayed by ground tests of the Kiwi-A series of reactors in 1959 and 1960.

The first experimental reactor system in the program, designated Kiwi-A, underwent a power run at the test site in the summer of 1959, and two similar devices, Kiwi-A Prime and Kiwi-A3, were tested in 1960. All the devices were run at design reactor power levels to heat the gaseous hydrogen flowing through the reactor cores.

Hydrogen has been selected as the propellant to be used in future nuclear-powered rockets in the U.S. program.

The reactor which is tentatively scheduled for testing in October is called Kiwi-B1. It will be operated -- using gaseous hydrogen as a propellant -- at a test cell in the

Jackass Flats area of the Nevada Test Site. A test of a similar reactor, pumping liquid hydrogen into the reactor system for the first time, is expected to be held early in 1962.

To make the accelerated test program possible, a number of construction projects, under the technical direction of the Los Alamos Scientific Laboratory, now under way or projected in the Rover Test area in Nevada, will provide greater capability for ground experiments with reactor systems. The present test cell is being modified to permit use of liquid hydrogen; another test cell is under construction; a third, an engine test stand, is in the engineering and contract letting stage; and the Maintenance, Assembly and Disassembly (MAD) Building is being expanded.

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# NEWS RELEASE

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
1520 H STREET, NORTHWEST · WASHINGTON 25, D. C.
TELEPHONES: DUDLEY 2-6325 · EXECUTIVE 3-3260

RELEASE NO. 61-119

**FOR RELEASE:** Monday, 2 p.m.
June 5, 1961

## SATURN LAUNCH COMPLEX 34

Construction has been completed on a massive rocket launching site at Cape Canaveral from which early Saturn space vehicles will be fired. It is the largest known rocket launching site in the world, and the first such base built especially for the peaceful exploration of space.

From this site the first Saturn heavy space vehicle will be fired in an experimental flight to test the booster propulsion system later this year. This will be the beginning of a series of large rocket test flights which is expected to lead, by 1965, to the launching of tons of instruments to the moon and Mars, and early versions of the three-man Apollo spacecraft which will ultimately be used for manned lunar landings.

The facility, known technically as launch Complex 34, will be turned over to the National Aeronautics and Space Administration by the Army Corps of Engineers on June 5. The turnover ceremony will signal the end of a two-year construction program in which some of the nation's top construction designers and craftsmen have been teamed.

Cost of the facility is about $43 million.

Among those taking part in the turnover of dedication program will be Lt. Gen. Walter K. Wilson, Chief of the Engineer Corps, and Dr. Kurt H. Debus, head of the NASA Launch Operations Directorate, a part of the George C. Marshall Space Flight Center at Huntsville, Ala., which is developing the Saturn. Dr. Debus will direct the installation of equipment during the next several months in preparation for the launchings which his organization will conduct.

The LOD drew up the general blueprints from which the facility was constructed. The Army Engineers were in charge of producing detailed design, awarding contracts and supervising construction.

Although unintended, the word "Complex" is a fortunate name for the facility. It is complex, and big:

--A 45-acre installation, dominated by a movable structure 310 feet high and containing 2,800 tons of steel.

--A blockhouse with walls 12-feet thick, having a steel door two feet thick which weighs 23 tons.

--Efficient fuel and liquid oxygen storage facilities which are capable of pumping 750,000 pounds of fluid into the big booster in less than an hour.

--A launching pedestal foundation reinforced by 4,400 cubic yards of concrete and 580 tons of steel.

--A total of one hundred million pounds of concrete used in construction.

--A unique automatic ground control station, a room 38 and 215 feet long, located beneath the concrete and steel launching pad.

When the first Saturn boosters arrive at Cape Canaveral, they will be taken directly to launch Complex 34 where they will be erected vertically on the launch pedestal in preparation for the mating with upper stages. Each rocket will spend several weeks at the complex until a long series of checkouts and verifications has been completed. Unlike many smaller rockets, these initial preflight tests will be made entirely at the launch area, instead of in a nearby hangar -- which will be constructed in the near future to support later Saturn vehicles.

The Saturn C-1 vehicle is to be launched from this complex. It will be a two- and sometimes three-stage rocket, depending on the mission, measuring 21½ feet at the base and standing some 160 feet in height. The lift-off weight will be about one million pounds. The booster, or first stage, will develop 1.5 million pounds of thrust, about four times greater than any vehicle yet fired by the U.S. A second-generation rocket, -- called Saturn C-2, will have considerably more power and will be able to more than double the 20,000-pound earth-orbital capability of the C-1. Some later C-1's and the C-2 will be launched from another launch Complex (37), located nearby, which is now in the final design stages, initial phases of launch Complex 37 construction will be started later this year.

Following are salient features of the major elements of launch Complex 34 --

Service structure - The service structure is 310 feet tall. It has twin legs measuring 70 feet (by) 37 feet wide at the base. The center opening, in which the rocket will be situated during checkout, is 56 feet wide. Each of the legs contains a two-floor building which houses the structure's operating equipment and rocket checkout apparatus. The structure weighs 2,800 tons, 1,700 tons of which is steel. Cost of the tower was about $4,000,000.

The structure provides a means of erecting the rocket on the launch pedestal. It has a bridge crane of 60-ton capacity, with two individually-operated hooks having capacities of 60 and 40 tons. For checking out and servicing the rocket, the structure has a work deck at the 27-foot level (at the base of the booster) plus seven fixed platforms at various elevations. There are also five movable, horizontally-retracting platforms which can be adjusted to embrace the vehicle at any desired level.

Said to be the world's largest movable wheeled structure, the tower is mounted on two pairs of standard-guage railroad tracks. There are four carriages, each with 12 36-inch diameter wheels. Four 100 horsepower motors which drive the carriages are powered by a 400 kilowatt diesel generator installed in the structure. The tower can be controlled by a single operator, situated in a cab at the 27-foot level. It is capable of moving from 1½ to 40 feet per minute.

Supporting the parallel sets of rails are two mammoth steel beams, eight feet deep, 10 feet wide and 538 feet long. The entire launch pad and service structure area was compacted to a depth of 28 feet by the "vibro-floatation" technique. Nearly 7,000 cubic yards of backfill material was used; the result was a relative density of 80 per cent in the foundation area.

After the checkout of the rocket is completed, the service structure will be moved to a paved parking area -- the position it occupies at launch -- some 600 feet away. During movement, a hydraulically-operated beam between the carriages and the tower support points equalizes the load among the carriages precisely. The hydraulic cylinders are then used to jack the tower up to effect the tie-down or anchor arrangement -- the 2,800-ton structure is lifted two inches. The tower is anchored at steel piers by huge wedges, hydraulically driven, to enable it to withstand hurricane winds of up to 125 miles per hour.

Control building - The Saturn control building is very similar to the blockhouses built at Canaveral for Titan and Atlas missiles. It has 12,500 feet of protected floor space on two levels, and an additional 2,150 square feet of unprotected space in an equipment room which will not be occupied during launchings. It is a circular, domed building 156 feet in diameter, with ceiling 26 feet from the floor. The inner dome or igloo is of reinforced concrete, five feet thick.

On top of this is an earthfill which varies from seven feet in the center to 14 feet at the edges. The final layer is four inches of gunned concrete. For blast deflection purposes, there is a slope of 35 degrees from the top. The main entrance door, of steel and concrete, weighs 23 tons. The building is designed to withstand 311,000 pounds of pressure per square foot. There are two alternate means of exit in emergencies, 42-inch concrete pipes whose primary purpose is for air intake. These terminate in a shed 300 feet from the building.

The first floor of the building is to be used by booster and upper stages contractor personnel involved in tracking and telemetry operations. Technical and building utilities, rest-rooms, etc., are also located there.

On the second floor, the main firing operation will be located. Equipment includes firing console, test supervision and conductor consoles and various monitoring and recording panels. A small observation room is separated by glass from the operating area. Prelaunch activities in the area can be viewed from an observation balcony on top of the control building.

Launch Pad: The launch pad is 320 feet in diameter. It is constructed of reinforced concrete eight inches thick. As indicated earlier, special foundations have been provided for the service structure and the launch pedestal, the two areas of the pad where there is great stress. In the vicinity of the flame deflector, the pad is paved with refractory brick to protect it from heat. The pad has a perimeter flume for taking away surface water, and possible propellant spillage.

Pedestal: In the center of the launch pad is the pedestal from which the Saturn will be fired. It is a structure 42 feet square and 27 feet high. The pedestal foundation contains 4,400 cubic yards of concrete and 580 tons of steel. The foundation is 160 feet by 106 feet, with depth varying from eight feet at the center to four feet at the edges. The top of this foundation is $9\frac{1}{2}$ feet below the surface of the pad. The earthfill between the foundation and the surface of the pad allows for the passage of various utility, high pressure gas and fuel lines.

Rising from the foundation and extending to 27 feet about the pad are four concrete and steel columns, seven feet and four inches square. To these columns are attached the bearing ring and anchor bolts for the rocket support arms. The columns are protected from the rocket's blast by insulated steel line plates.

Bolted to the ring at the top of the pedestal are eight arms. Four of these are used solely to support the weight of the rocket, while the other four both support the rocket and restrain it from liftoff until the proper burning condition has been achieved by all eight Saturn engines. These arms are fabricated of steel and are automatically controlled during the launch sequence.

Deflector: Beneath the launch pedestal is a rail-mounted flame deflector. This 120,000-pound steel structure diverts the 5,000-degree F. jet stream in two, opposite horizontal directions. The deflector is 20 feet high and 50 feet long; the deflection angle beneath the engines is 60 degrees. While not in use, the deflector is parked on rails away from the pedestal. A spare deflector is parked on the opposite side of the pedestal.

Umbilical Tower: Adjacent to the launch pedestal is the umbilical tower, the main function of which is to provide electrical and pneumatic lines to the rocket. At present the Complex 34 tower is only 27 feet tall. It will be increased in height as live upper stages are added to the rocket. The tower is 24 feet square at the base. (It can be increased to about 275 feet in height.) There is a steel bridge and a cableway connecting the umbilical tower to the launch pedestal.

Automatic Ground Control Station: There is a room, known as the automatic ground control station, immediately beneath a major portion of the launching pad. It extends from the west edge of the pad eastward toward the control building, avoiding the launch pedestal area. The room is 215 feet long and 38 feet wide, ceiling height is 9 feet. It serves as a distribution point for all measuring and checkout equipment, power, and high-pressure gas. Included is a generator room which provides DC and AC power. The room is not occupied during launching.

A tunnel for personnel, and for passage of a dozen racks of cables, extends from the AGCS to the other side of the pad. The cables are then fed into a roofed cableway which leads to the control building.

Fuel System: RP-1 fuel (kerosene) is provided to the booster from two above-ground tanks located about 950 feet from the launch pedestal. The tanks are 15 feet in diameter and have a capacity of 30,000 gallons each. A retaining wall is provided, along with revetments to retain the fuel should a tank rupture. An eight-inch fuel line leads to the rocket. There are two 1,000-gallon-per-minute pumps. Fuel is brought into the facility by truck transporters, three of which can unload at the same time. Unlike many other fueling operations, this one is completely automatic, being operated from the control building fuel loading panels. Normally, the booster will be fueled in about 40 minutes, although it could be accomplished in about half that time.

A facility for liquid hydrogen, the high-energy fuel to be used in Saturn upper stage, is to be ready by the time the live upper stages are phased into the program.

Liquid Oxygen System: There are two liquid oxygen (LOX) storage tanks some 650 feet from the launch pedestal, well removed from the fuel facility. The main vessel is an above-ground sphere, with an outside diameter of 43 feet. The tank is surrounded by four feet of "perlite" a mineral insulating powder, which controls the evaporation loss of less than half of one per cent per day. An earth revetment protects the LOX facility on the side of the launch area. A six-inch line feeds the rocket, at a flow rate of up to 2,500 gallons per minute. Normally about 40 minutes will be required to fill the Saturn booster's five LOX tanks, which hold an estimated seven tank cars loads. It can be done in much less time. The main LOX container operates under about 20 psi (pounds of pressure per square inch.)

A small liquid oxygen tank is used for replenishing the oxygen which boils off during the latter stages of launch preparation. It is a 13,000-gallon capacity tank, 12 feet in diameter by 25 feet in length, located near the main tank. Vacuum insulation assures the same low evaporation loss. A three-inch line, under 200 psi, leads to the booster.

The same LOX facility will be used in providing oxidizer for the upper stages of Saturn later in the program.

High Pressure Gas Facility: There are several uses of gaseous nitrogen and helium in the preparation and firing of the Saturn. A high pressure gas facility is located about 1,100 feet from the launch pad and 200 feet from the control building.

There are 36 $15\frac{1}{2}$-cubic-feet (water volume) storage vessels divided into two groups. Four vessels contain helium used for bubbling the LOX tanks of the booster to keep the LOX from forming strata of different temperatures. Thirty-two tanks contain nitrogen which is used for purging fuel and LOX lines, engine and instrument compartments, for air bearings and for certain pressure-operated components such as valves. All of these tanks operate at 6,000 psi.

Other equipment includes two helium booster compressor units, which take helium from trailers and boosts it to the desired pressure level; two trailor-mounted converters to change liquid nitrogen to gaseous nitrogen, each having a 1,000-gallon storage capacity.

A total of seven double extra heavy steel lines carry the gases to the launch pad; they vary in size from $2\frac{1}{2}$ to $1\frac{1}{4}$ inches. All gas distribution is made from the automatic ground control station, remotely operated from the control building.

An additional gas facility is planned, adjacent to the launch pad, which will provide 600 cubic feet storage capacity for gaseous helium, to be used for pressurizing booster LOX tanks. There will be a total of 27 vessels, 16 inches by 23 feet.

Skimming Basin: A skimming basin is located about 300 feet from the edge of the pad on the beach side. This is a paved vat one-hundred and four feet by one-hundred and eighty feet which is used for the separation of water and fuel resulting from spillage, or from unloading booster fuel.

Water System - A water system has been installed on the pad and throughout the service structure, primarily as a safety measure. Water is available at all work levels on the tower for fire protection. There is a "pad flush" system to wash away spilled fuel. At the launch pedestal there is a quenching system for use in case fire occurs accidentally in the "boattail" or engine compartment. This system is also used to prevent back-flame from entering the engine compartment in case the engines are cut-off immediately after ignition and before liftoff. Four 3,500-gallon-per-minute nozzles are being installed at the pad surrounding the rocket at about 100 feet distance, as a general fire protection measure.

Operating Support Building: On the opposite side of the control building from the launch area, an operations support building is under construction. This building contains about 30,000 square feet of floor space, and will be used for general shop and engineering activities, and spare parts storage.

Communication System: A voice communications system is being installed by the launch operations directorate. The system is designed for clear, reliable voice transmission regardless of high noise environment. The system will consist of up to 200 stations scattered throughout the 45-acre installation.

## PARTICIPANTS

Construction of the Saturn Complex was accomplished under the direction of the Jacksonville (Fla.) district of the U.S. Army Corps of Engineers. The project engineer was Capt. Frederick F. Irving. Donald E. Eppert, Canaveral area engineer, served as overall engineer corps coordinator.

Within the launch operations directorate, the launch facilities and support equipment office, Huntsville, headed by Theodor Poppel, was in charge of the project. R. P. Dodd heads the launch facility design group of LOD at Cape Canaveral, a segment of Poppels office.

Hundreds of firms were involved in construction as prime contractor, subcontractor or supplier.

Diversified Builders, Inc., Montebello, Calif., was the prime contractor on the control building. This work began June 8, 1959, the first element of the complex to be built.

The Kaiser Steel Co. was the prime contractor on the service structure.

The Henry C. Beck Co. of Palm Beach, Fla., built the launch pad, pedestal, high-pressure gas and propellant facilities, and other facilities and roads in the area.

The Complex was designed by Maurice Connell and Associates, Miami, with the Kaiser Steel Co. doing the final design of the service structure.

Overall NASA headquarters planning and coordination is exercised by the Office of Launch Vehicle Programs. Maj. Gen. Don R. Ostrander is Director and Samuel Snyder is Assistant Director for Launch Operations. Richard B. Canright is Saturn Program Manager.

# NEWS RELEASE

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
1520 H STREET, NORTHWEST · WASHINGTON 25, D. C.
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FOR RELEASE: IMMEDIATE
June 7, 1961

Release No. 61- 120


## NASA ADMINISTRATOR REALIGNS HEADQUARTERS FUNCTIONS

Organizational and functional changes designed to streamline operations within the National Aeronautics and Space Administration headquarters have been made by James E. Webb, Administrator.

Under the new plan, the Office of Programs is established in the Office of the Associate Administrator to bring together technical and budgetary review and evaluation in a single office.

D. D. Wyatt was named Director of the Office of Programs. He will assist the Associate Administrator, Dr. Robert C. Seamans, Jr., in carrying out his agency-wide program management responsibilities. Wyatt was former Assistant Director in the Office of Space Flight Programs.

The Office of Business Administration, headed by Albert F. Siepert, Director, has been redesignated the Office of Administration. This office will continue to report to the Associate Administrator and to perform its previous functions. It will serve as an administrative staff resource for both NASA general management and the technical program offices.

The Office of Administration will also provide direction and assistance to NASA field installations in the performance of administrative functions. In addition it will direct activities of the Western Operations Office, Santa Monica, California.

The Director of the Office of Programs will be in charge of program budgeting and reprogramming, and for the review and coordination of Project Development Plans, coordination of facilities planning and construction, and preparation of program reports.

The Office of Reliability and Systems Analysis and the Office of Program Analysis and Control will be incorporated in the Office of Programs.

In addition to Wyatt, the following appointments have been made in the Office of Programs:

William A. Fleming, Assistant Director for Project Review; Thomas E. Jenkins, Assistant Director for Management Reports; Ralph E. Ulmer, Assistant Director for Facilities; Donald Cadle, Resources Programming Officer; and Dr. Albert Kelley and Bernard Maggin, members of the staff of the Assistant Director for Project Review.

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# NEWS RELEASE

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
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FOR RELEASE: IMMEDIATE
June 7, 1961

RELEASE NO. 61-121

Joint Atomic Energy Commission and National Aeronautics and Space Administration News Release

## NUCLEAR ROCKET ENGINE CONTRACTOR SELECTED FOR CONTRACT NEGOTIATIONS

Glenn T. Seaborg, Chairman of the Atomic Energy Commission, and James E. Webb, Administrator of the National Aeronautics and Space Administration, have announced plans to negotiate with an industrial team for a first phase contract for the development of the NERVA* nuclear rocket engine. The team consists of Aerojet General Corporation and Westinghouse Electric Corporation.

Aerojet General Corporation and Westinghouse Electric Corporation were two of the seven companies that submitted proposals to the joint AEC-NASA Space Nuclear Propulsion Office on April 3, 1961, in response to the invitation for proposals issued on February 2, 1961.

NERVA is part of Project ROVER -- a joint AEC-NASA program for the development of a nuclear rocket propulsion system. The reactor to be used in NERVA will be a follow-on to prototype reactors under development at the Los Alamos Scientific Laboratory. All aspects of the ROVER program are under the direction of Mr. Harold Finger, manager of the joint AEC-NASA Space Nuclear Propulsion Office (SNPO). The NERVA contract will be administered and technically directed by the SNPO.

The first phase contract will be for six months, with continuation beyond that period based on an evaluation by the Government of performance and requirements.

The first phase contract will include design of the NERVA engine, performance of work responsive to the needs of Los Alamos Scientific Laboratory in the conduct of the Kiwi-B reactor tests, preparation of a developmental plan and schedule of costs and work required to meet a feasible flight schedule date. Research and developmental work will also be involved in this first phase.

Other companies which submitted proposals were: American Metal Products Corporation, Ann Arbor, Michigan; General Electric Company; Pratt & Whitney Division, United Aircraft Corporation; Rocketdyne Division, North American Aviation, Inc.; and Thiokol Chemical Corporation.

- END -

*Nuclear Engine for Rocket Vehicle Application

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# NEWS RELEASE

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
1520 H STREET, NORTHWEST · WASHINGTON 25, D. C.
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FOR RELEASE: JUNE 6, 1961

RELEASE NO. 61-122

PRESS CONFERENCE

ON

MEDICAL AND TECHNICAL RESULTS

OF THE

FIRST U. S. MANNED SUBORBITAL SPACE FLIGHT

Washington, D. C.
Tuesday, June 6, 1961

PRESENT:

DR. HUGH L. DRYDEN, Deputy Administrator, NASA;
ROBERT R. GILRUTH, Director, Space Task Group, NASA;
WALTER C. WILLIAMS, Associate Director, Space Task Group, NASA;
DR. LLOYD V. BERKNER, Chairman, Space Science Board, National Academy of Sciences;
DR. C. H. ROADMAN, Acting Director, NASA Life Sciences Programs;
ALAN B. SHEPARD, Astronaut; and
DONALD K. SLAYTON, Astronaut.
LT. COL. JOHN POWERS, Public Affairs Officer, Space Task Group, NASA.

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POWERS: Ladies and gentlemen of the news media, I have gathered here on the podium the chairmen of the several panels who were present here today and made the several presentations. I assume by this time you have all picked up a copy of the blue book which was available in the foyer.

We have but one ground rule this afternoon, and that is that we would like to confine our discussion here today to the matters at hand, that is, the matters of the presentation today. If we can confine it to that, and if you are prepared, we are quite ready to try to respond at this time to any questions that you might have.

QUESTION: This is addressed to Mr. Williams.

What procedures will receive less time -- maybe it is to Deke Slayton -- which procedures will receive less time in the training process, and which greater emphasis?

WILLIAMS: I think both Slayton and Shepard made it quite clear. Obviously all of our astronauts have been through the total curriculum, if you will, and were all pulled through the same knothole, that hole being shown this afternoon. However I am sure that in future flights, the basic preflight preparation we talked about, which is familiarization with the particular capsule they are going to fly, the procedures trainer, and familiarization with the particular mission they are going to fly, the mission profile, I am sure that these are the things which will receive the most emphasis.

QUESTION: Which will be eliminated, Mr. Williams?

WILLIAMS: This is the point I tried to make.

On this detailed training, obviously they are not going to go through desert survival, or this type of thing. All seven of these men have been through this training. They are up to a point of readiness. It is now the final tuning, you might call it, which will be learning their particular spacecraft, learning their particular flight plan, and exercise on the procedures trainer.

Do either of the astronauts have anything to add?

Deke?

SLAYTON: I think you have covered it all.

QUESTION: Shorty, Al Shepard said a minute ago that he thought on later flights there ought to be a few less things to do. Has it been arranged that there will be a few less things to do, or different things to do, and if so, what?

WILLIAMS: Yes, there will be less to do. On this particular flight, if you heard the earlier account of what was planned, actually practically every second was accounted for. The flight plans have been worked out. To be quite honest I haven't seen them myself so I can't comment on them. I will say this: they will be, again, primarily in the direction of the successful completion of the mission, and then whatever tests can be made along the way without compromising the first objective.

QUESTION: He was quoted some time ago as saying that he thought he ought to have more time to look at what he is passing over, and so forth. Will that be taken care of?

WILLIAMS: I believe this is right, yes.

QUESTION: Could you give us any more on this?

WILLIAMS: Right now this is the flight plan that the pilots themselves have been working on. Would either of them care to comment.

SLAYTON: I have seen the flight plan. I am not in position to comment on it at this time in any detail. It is still in the process of being passed around.

What I said was that the flight plan has been pre-printed and it is in the process of being coordinated throughout the Space Task Group at the present time. I saw it for the first time yesterday. I don't think that we are in a position to discuss what it consists of at this time because it is not our final flight plan.

QUESTION: For suborbital flight.

WILLIAMS: Affirmative.

QUESTION: I would like to ask whether Alan Shepard had difficulty hearing the ground, hearing CAPCOM at the time that the booster passed through this transonic region of maximum vibration.

POWERS: Alan, do you care to comment on whether you had any difficulty hearing as you passed through this transonic area?

SHEPARD: The question was with respect to radio reception during the transonic phase. We had no trouble at all hearing during that period. The requirement to change the receiver volume level was not apparent, as it was not apparent during the period immediately after lift-off when we had a lot of ambient noise from the booster.

I was not required to change the volume level of the receiver at any time. The vibration which was described did not interfere with it at all.

QUESTION: If you could not have seen an abort light on your panel, you could still have heard the command from the ground during this period when you could not see the instruments very well?

SHEPARD: That is correct, yes. I could also have seen the light itself. The point here, let me make this again, we are talking about the transonic period and we are talking about the vibration as a result of air flow at max-q.

Maybe you weren't here for the film, but during that period I reported at 1 plus 13 or 1 plus 18 that the cabin pressure was sealing, which meant that I could read a gauge about this size with a little needle on it 5.5 psi. So the vibration that was reported certainly wasn't of any great magnitude. We don't consider it to be a problem and we would like you to keep it in that context.

QUESTION: Can we pursue this a moment?

One of the papers said that you couldn't see the instrument panel at all for 15 seconds.

SHEPARD: That was out of context; I am sorry.

QUESTION: How long was it, Al?

SHEPARD: The period of vibration lasted approximately 15 seconds. It varied in intensity. It did not vary in frequency. The transmissions were made during that period; observations were made during that period. We don't consider it a problem at all from the pilot's standpoint. The problem with respect to the air flow we feel we have adequately changed. We have adequately demonstrated the use of the redesigned clamp ring fairing on the shot from Wallops Island prior to my flight. In other words we don't consider that a problem at all associated with the transonic period or the max-q period.

QUESTION: Alan, what was out of context? You referred to something out of context?

SHEPARD: I was trying to say that I was misquoted.

QUESTION: What I am talking about is your own paper in this blue book said that your vision was blurred for several seconds.

SHEPARD: Yes. It wasn't completely blurred. Just an indication that my head was vibrating and affecting vision.

QUESTION: The paper we were quoting was the one which stated "During the phase of launch approximating maximum dynamic pressure, considerable vibration was encountered so that the instrument panel could not be read. This vibration lasted for a period of approximately 15 seconds."

SHEPARD: That statement is in error. I am sorry it got in that way. My apologies for that.

GILRUTH: I would like to make an observation here. I think it would be very difficult for anyone to argue with Al about whether or not he could see.

QUESTION: A question for the Commander. I wonder, in his reference here to the "proof that an undrugged, undoped individual is capable of conducting space flight," whether he is suggesting that somebody else might have been drugged or doped?

SHEPARD: Unfortunately I wasn't able to observe the activities of some of my friends in the Cocoa Beach area. Just what stimulants we used before and after the flight, I don't know.

The reason I put that in there, quite frankly, I had intended to make a statement to this effect and I forgot it in my original speech, so I just threw it in at the last minute.

QUESTION: In Aleck Bond's paper we see that the weight of the Mercury spacecraft for the first time is 4,040 pounds. This is considerably more than about one ton. Is this the weight of the orbital spacecraft also?

POWERS: Not necessarily. I think I can answer that. That was lift-off rate on MR-3. It was the weight that we certified to the FAI.

QUESTION: Will the lift-off weight of the orbital capsule be about the same?

POWERS: I don't think we discussed the orbital program here today, and we suggested at the outset that we ought to stick to the matters at hand that were discussed today.

QUESTION: What was the injury to your foot that was described in one of the papers, which you suffered prior to the flight?

SHEPARD: I think somebody said that somebody stepped on my foot. That, essentially, is correct.

QUESTION: I want to follow up on the question here, if Mr. Bond is around. He uses this figure of 4,040 pounds for the spacecraft payload weight on MR-3. I had never heard that figure before. I wonder if we could get a major component breakdown. I don't mean ounce by ounce, but how much of this was capsule, how much was Shepard -- we know, 169 pounds -- and how much was the tower and so forth?

POWERS: I am sorry we cannot give you that breakdown.

QUESTION: Why not?

POWERS: Because you are talking about leading up to the orbital vehicle and the performance capabilities of the Atlas.

QUESTION: I am talking about something that is in the paper today. I am not talking about the orbital one. I am talking about capsule No. 7.

POWERS: The weight factor you have is the only one that we will reveal.

QUESTION: But you have already released something like 2300 or 2500 pounds. I am asking you for an explanation of the discrepancy between the two figures that you have released.

POWERS: No, sir. We have been describing the weight of the vehicle in terms of about one ton.

QUESTION: About one ton. Four thousand and forty pounds is not about one ton.

POWERS: May I finish, sir? Up until this time we have been describing the vehicle as being about one ton. We are now down to manned flights, and at times we have to certify the gross weight, its gross lift-off weight, which we did, and that is 4,040 pounds.

QUESTION: I don't understand what you mean by gross lift-off weight?

DRYDEN: That is the total weight sitting on top of the Redstone.

POWERS: At the instant of lift-off.

QUESTION: Where does the one ton figure come in?

DRYDEN: The capsule itself.

QUESTION: The capsule itself is one ton?

POWERS: About one ton.

QUESTION: I would like to ask Commander Shepard about his statement about peroxide control movements. It does seem to include partially orbital flight. I don't think I am broadening it in those terms. All I want to ask is whether Shepard is concerned whether the peroxide fuel might become a penalty from excessive use, whether he might have control difficulty in an orbital flight.

SHEPARD: No, I didn't mean to indicate that at all. If I did, I am sorry. I think that we are interested, of course, in economical use because we don't carry an over-abundance of peroxide. Actual finite values, we are in good shape. All indications are we are still in good shape for the orbital flight.

QUESTION: Who stepped on your foot, Commander? Is that classified? Not some of the competition?

QUESTION: Are you any closer to telling us when and who?

POWERS: Yes. Finished.

QUESTION: On the next go-round?

POWERS: We are here today to report on the MR-3 flight. I think that is the extent of our comments today.

QUESTION: This is a question for Dr. Gilruth.

What do you think this flight has shown with respect to the necessity for qualifying astronauts with a suborbital space shot before you commit them to, say, an orbital space flight?

GILRUTH: I think one of the most interesting things to me, at any rate, that Al's flight has shown, is the skill with which our training people developed these various trainers, and the help they were to the pilot in making a flight like this one. This of course can only be determined by going through a training program and then making a flight. This I think is very encouraging and very gratifying.

I think it is too early to draw any hard and fast conclusions, however, on the basis of just one flight.

I want to say the indications are that many of the things that an astronaut has to learn can be learned on the ground. I think it is too early yet to say that you can dispense and rule out in the future suborbital flights as a possible training aid.

POWERS: We have time for one more question.

QUESTION: I didn't quite understand your answer to the question about the undoped, undrugged bit. Who were you referring to?

SHEPARD: I will now insert two sentences that I intended to insert in my presentation, but which I forgot and stuck in at the tail end.

Of course attention was given, there is no question about it, back months ago to this possibility in our program and in other programs, too; I am sure you have heard of these expressions: It was determined that there was no need for it in our flights, either the suborbital or the orbital flights, and as a result there were no drugs or stimulants used on me.

POWERS: Thank you very much.

(Whereupon, at 4:41 p.m., the Conference was concluded.)

FOR RELEASE UPON PRESENTATION

Release number 61-123

Statement of
Mr. James E. Webb, Administrator
National Aeronautics and Space Administration
before the
Committee on Aeronautical and Space Sciences
United States Senate
June 7, 1961

Mr. Chairman, Members of the Committee:

For myself, Mr. Gilpatric, and Dr. Seaborg, I should like to thank you for the opportunity to appear jointly to present the national space program which President Kennedy has recommended to the Congress.

On March 24th the President submitted a request for an increase of $125 million in the civilian space program. This submission was (1) to fund more adequately the F-1 1 1/2 million-pound-thrust engine which continues to show real promise as a basic building block for large boosters, and (2) to provide funds to step up the C-2 version of the Saturn booster to increase the Saturn capability from about 20 thousand pounds in a low earth orbit to over 40 thousand pounds. There were other items included, but they were all based on the President's decision that we should proceed at once to plan and carry out manned space flight projects beyond the Mercury program and to proceed as rapidly as possible toward the practical utilization of the scientific and technological information and capability gained through our space effort. To utilize the technology which was emerging from our investment in space, work toward applications of tremendous value was included in such areas as communications satellites and weather satellites.

On May 24th, the House of Representatives authorized the President's initial requests and in some programs authorized increases. The results of action by the House are now before you in H.R. 6874.

On May 25th, President Kennedy reported to the Congress that, regarding the space program, "with the advice of the Vice President, who is Chairman of the National Space Council, we have examined where we are strong and where we are not, where we may succeed and where we may not." The President then made additional policy recommendations, in these words: "Now it is time to take longer strides -- time for a great new American enterprise -- time for this nation to take a clearly leading role in space achievement, which in many ways may hold the key to our future on earth."

Having stated these views with respect to space, the President then used these words: "Let it be clear -- and this is a judgment which the members of Congress must finally make -- let it be clear that I am asking the Congress and the country to accept a firm commitment to a new course of action -- a course which will last for many years and carry very heavy costs. . . ."

The following day, May 26th, the President submitted additional [illegible] estimates of new obligational authority needed for the fiscal year 1962 amounting to $549 million for the National Aeronautics and Space Administration, $77 million for the Department of Defense, $23 million for the Atomic Energy Commission, and $53 million dollars for the Weather Bureau of the Department of Commerce.

With your permission, I should like to indicate the main areas of increase fo r the National Aeronautics and Space Administration and then Mr. Gilpatric and Dr. Seaborg will explain the increases for the Department of Defense and the Atomic Energy Commission.

In the 549 million dollars increase for the National Aeronautics and Space Administration are the following:

For the Apollo spacecraft and for supporting research facilities and work in the life sciences, $202,500,000;

For the F-1 engine, with needed test and other facilities, for the Nova vehicle with necessary test and other facilities, and activities related to an aggressive beginning on the Nova vehicle, $121.5 million dollars;

For unmanned lunar exploration, $56 million;

For general supporting research, tracking-station facilities, sounding-rocket programs, and advanced-facility design, $74 million;

To speed up both the research and a start toward a transitional system of communications satellites, $50 million;

For engine development for the nuclear rocket Rover, $23 million;

For the purchase and launch of additional Tiros weather satellites so that one can be kept continuously in orbit until the Weather Bureau is able to place in operation its world-wide system based on the Nimbus satellite, $22 million dollars.

The above increases, added to those previously recommended by President Eisenhower and President Kennedy, constitute a total budget request for the National Aeronautics and Space Administration for the fiscal year 1962 of $1,784,300,000. My associates and I are prepared to present the details of this budget request following the statements to be made by Mr. Gilpatric and Dr. Seaborg.

The sums requested are necessary to an adequate national space program and to a rapid build-up toward the accomplishment of the objectives which have been stated by the President. These requests, taken together with those to be presented on behalf of othe other agencies, constitute a hard hitting, well-rounded, national space effort.

In the execution of this very important program, the President has directed each of us holding a major management responsibility to work closely with the officials in other agencies concerned, to make every effort to use the most efficient resources available to the Government wherever they may be, and to keep the Vice President and staff of the Space Council thoroughly abreast of our efforts. For myself, I would like to say that I have never found better teamwork than has been achieved in the development of this program, and I am proud to be associated in this effort with the two men here with me today and with the Department of Defense, the Atomic Energy Commission, the Weather Bureau, the Federal Aviation Agency, and all who are working with us.

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# NEWS RELEASE

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
1520 H STREET, NORTHWEST · WASHINGTON 25, D. C.
TELEPHONES: DUDLEY 2-6325 · EXECUTIVE 3-3260

FOR RELEASE: UPON DELIVERY

No. 61-124

Commencement Address

by

James E. Webb, Administrator

National Aeronautics and Space Administration

George Washington University

June 7, 1961

* * *

President Carroll, Distinguished Trustees, Learned Faculty, Graduates, Families, Friends:

I deeply appreciate the honor that George Washington University has conferred on me tonight. As a student who found here in the Night Law School during the 'thirties encouragement, opportunity, and learning, and as a Trustee who found here in the 'fifties an opportunity for service, I have an abiding appreciation and love for George Washington. This action by the University means more than I can say.

Thirty-five years ago, in March 1926, the father of American rocketry, Dr. Robert H. Goddard, converted an early study and interest in rockets into a successful flight. His rocket -- fueled with gasoline and liquid oxygen -- rose only 41 feet, traveled a grand total of 184 feet, and seemed to offer no more promise than did the first flight of the Wright Brothers. And yet, both flights ushered in new epochs in man's mastery of the earth's atmosphere and of the space beyond.

Forty years from tonight, you who are graduating here, will be among the first and most experienced citizens to carry on your 20th century careers into the twenty-first century. What changes will occur in that time? In some of the physical sciences, our knowledge doubles every ten years. We live in an environment of momentous change, of a driving, restless, insatiable search for new knowledge.

In fifty-eight years we have come from the fragile plane of the Wright Brothers, through the lone-eagle flight of Lindbergh, to swift, routine air travel which permits the President of the United States to meet with the Premier of the U.S.S.R. in Vienna on Sunday, stop to see the Prime Minister in London on Monday, and be back in the capital of his own country on Tuesday morning.

In the three and a half decades since Goddard launched his primitive rocket, we have seen in the U.S. the development of a combined rocket and aeronautical capability that permits test pilot Joe Walker in the NASA X-15 to jab forty miles up into space and return to the earth's atmosphere repeatedly, achieving speeds above 3,000 miles per hour and landing back at his home base. Most of the rocket development has taken less than a decade. We have seen in less than eight years the development of a rocket that could boost Astronaut Shepard into space 115 miles above the earth, to learn what it means to experience that state of weightlessness which is unachievable on the earth's surface. At an accelerating pace during the past three and one-half years, the United States has launched 39 satellites and four deep space probes. Twenty-four of our satellites are still in orbits around the earth and two of the probes are in orbits around the sun. Nine of the satellites are still transmitting useful information.

As an example of how our space program works, on March 11, 1960, NASA launched a deep space probe, called Pioneer V, to gather scientific data and to test communications over interplanetary distances. Pioneer V weighed 94 pounds and contained two radio transmitters and receivers, plus instruments to measure radiation streaming from the sun, the spatial distribution of energetic particles and medium-energy electrons and protons, the number and density of meteoric dust particles striking the probe, and the strength of magnetic fields.

We communicated with Pioneer V for a distance of 22 million miles, and through it confirmed the existence of an electrical ring current circling the earth at an altitude of 40,000 miles, about which geophysicists had been speculating for more than 50 years.

Pioneer V also measured an intense zone of disturbed magnetic fields at distances of 40,000 to 60,000 miles from the earth; revealed that the boundary of the earth's magnetic field is twice as far from earth as had been previously supposed; and reported the first direct observation of pure cosmic rays at altitudes completely free of the earth's atmosphere. This observation was made three million miles in space.

I could list many other examples, such as the discovery of the Van Allen Radiation Belts, or the fact that our first weather satellite, TIROS I, completed more than 1,300 orbits of the earth and transmitted more than 22,000 pictures before we lost communication with it. A large number of these proved of great value in increasing our knowledge of weather phenomena.

I could go on to mention Echo I, NASA's brightly twinkling earth-orbiting balloon, seen by millions of observers around the world, which has proved the feasibility of using satellites to reflect radio and other signals. Put up with a life expectancy of three months, it has already lasted a year. It is showing wrinkles, and we suspect it has been punctured by many micrometeorites. If we could get it back, it would answer many questions about conditions in space.

The U.S. space effort has made tremendous progress since man fired into orbit the first artificial earth satellites three and one-half years ago. I believe it is fair to say that during this period the United States has achieved first position in space science and technology, and has fully merited the confidence of the world scientific community.

All of this began in the second quarter of the 20th century, with the determination and spirit of Dr. Goddard, best expressed in his own words which were: "It is difficult to say what is impossible, for the dream of yesterday is the hope of today and the reality of tomorrow."

Perhaps in this third quarter of this century I may be permitted to ask tonight whether your dream of yesterday on entering the George Washington University, is your hope for today as you graduate, and whether you are prepared to accept it as the reality of the 21st century. If so, I suggest that the feeble rocket that first flew for Dr. Goddard 35 years ago is growing up, and before this quarter is over, will become the gigantic Nova booster which will be as large at its base as the Washington Monument, will stand two-thirds the height of that imposing shaft, and with a thrust of 12 million pounds will rocket three men to the moon and have enough additional power to return them to earth.

I suggest also that you consider the estimate, made in last Sunday's New York Times, of an annual revenue from a space communications satellite system which might reach the $100 billion mark long before the year 2001. I have not seen the information on which the writer based his forecast. It may be too optimistic, but it does equal the amount we as a nation now spend each year for all forms of transportation -- air, land, water, bus, automobile, subway, truck, and train. Last year, this was one-fifth our gross national product.

The availability of such a global system will reduce communication costs, improve service, greatly increase the ones which can be served, and bring immense benefits to industry. According to Dr. Lloyd V. Berkner, Chairman of the Space Science Board of the National Academy of Sciences, "...Satellites can multiply the quantity of long distance communications by a factor of perhaps 10,000."

As you ponder these facts, I suggest that you dream no little dreams, or Dr. Goddard's reality will leave you far behind long before the 21st century.

Before the third quarter of this century ends, the planning, the preparation for, and the landing of a three-man team on the moon will become a vast enterprise involving a large part of U.S. science and technology. It will add zest and stimulation to almost every level of education, industry, government, and to life in general. It may provide a powerful focus for the need of all mankind to participate cooperatively in space research and exploration. Even at our present rate of progress in space, we are developing a science and technology whose powerful influence will be increasingly felt throughout our country and the world.

This science and technology will almost certainly differ from what might have come into being without the drive and integrating force of a major space effort. Further, the goal of mastering space is essential insurance against arriving at some point with a technology inferior to that of the Soviet Union which will undoubtedly continue pushing forward along the space frontier. It is also insurance against military use being made of the new technology to jeopardize our security.

I am convinced that this country could not stay out of space technology under any circumstances, any more than we could have remained aloof from aviation if someone in another country had flown before the Wright Brothers.

President Kennedy has determined that an important key to our future position lies in going beyond the Mercury one-man spacecraft in which Astronaut Shepard made his flight. The President feels we have the ability and we must move on to giant boosters, powering larger craft with crews of several men on long voyages to explore deep space, the moon, and the planets.

Not all the effects of the national space program will be confined to space itself, even in the earliest years. Of great importance is the impression our space effort will make on the minds of men around the world.

Today prestige is one of the most important elements of international relations. It is a complex of old principles and new concepts, and its scope has broadened immensely. Essential to our prestige today is the belief of other nations that we have capability and determination to carry out whatever we declare seriously that we intend to do. There is no denying that in the eyes of the world, during the past few years, our capability and determination have been brought into serious question. In the minds of millions, dramatic space achievements have become today's symbol of tomorrow's scientific and technical supremacy. There is without a doubt a tendency to equate space and the future. Therefore, space is one of the fronts upon which President Kennedy and his Administration have chosen to act broadly, vigorously, and with continuous purpose. In no field can we gain more of what we need abroad and at the same time achieve such a wealth of practical and useful results at home.

It may seem hard to believe, but I am prepared to assert categorically that you as a citizen, as a future parent, as a patient in a hospital, will benefit from space exploration in your daily life. It will open up new opportunities for service and profit. The kind of job you get and your pay for it will be better.

Already our push into space has produced a ceramic that is made into pots and pans that can be moved from the coldest freezer into the hottest flame without damage. Our study of foods most suitable for space flight will lead to improved nutrition for the earthbound. Space research has created new materials, metals, alloys, fabrics, compounds, which already have gone into commercial production. From our work in space vacuum and extreme temperatures have come new durable, unbreakable plastics that will have a wide variety of uses, such as superior plumbing and new types of window glass that will filter intense light. Our scientists have devised minute instruments called sensors to gauge an astronaut's physical responses in space, to measure his heartbeat, brain waves, blood pressure, and breathing rate. In the future these same devices could be attached to hospital patients so that they could be watched by remote control, and their condition recorded continuously and automatically at the desk of a head nurse.

Beginning with World War II, science and technology were harnessed to large-scale organized effort. In the postwar period the expansion of the nation's research and development has reached a point where the total dollars invested by government, by industry, and by universities is at a level of about $14 billion a year. This is the base from which our new space effort now takes off, and it is the same base from which our most successful industries supply our newest needs.

Perhaps the truest lesson we have learned since World War II is that dollars invested in research and development are high-powered dollars -- they produce better answers to our problems, better things for our use, and better jobs in growth industries. This will be equally true of the research dollars we spend in space.

And let me point out here that by no means do men have a monopoly on careers in space. Ann E. Bailie, a gifted young

NASA scientist, made important contributions to the recent investigation which revealed that the earth is shaped more like a pear than a bulging sphere. Dr. Nancy Roman is chief of NASA's Astronomy and Astrophysics Satellite and Sounding Rocket Programs and Eleanor C. Pressly is head of the Vehicle Section of the Space Sciences Division at Goddard Space Flight Center.

To grasp the speed and dimensions of man's surge into the Space Age, consider this: It is estimated that about nine-tenths of all men and women ever trained in science and technology are alive today. This is true in other nations, as well as our own.

As a nation, we cannot escape the fact that, regardless of how we got there and regardless of whether we like it or not, we are in competition with the Soviet Union to prove the merits of our social, economic, and political system.

We dare not lose this contest, and I want to state my conviction that we shall not lose it.

# # #

# NEWS RELEASE

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
1520 H STREET, NORTHWEST · WASHINGTON 25, D. C.
TELEPHONES: DUDLEY 2-6325 · EXECUTIVE 3-3260

FOR RELEASE: Tuesday, AM's
June 13, 1961

RELEASE NO. 61-125

## BARRACKS GETS NASA INFORMATION POST

Robert A. Barracks has been appointed NASA's Western Information director, and will be responsible for NASA information activities in the southern California area. He will be located at the Western Operations Office, 150 Pico Blvd., Santa Monica (Tel. EX 3-9641, Home, Oxnard HU 3-6085).

Barracks has transferred from the public affairs office of the Pacific Missile Range, Point Mugu, Calif., where he has been located since May, 1958. He is a veteran newspaperman. On active duty in World War II and the Korean War, he was engaged in Navy public information in the Pacific Fleet and Washington. He succeeds Matthew H. Portz, who has joined the Aerospace Corporation, El Segundo, Calif.

- END -

# NEWS RELEASE

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
1520 H STREET, NORTHWEST · WASHINGTON 25, D. C.
TELEPHONES: DUDLEY 2-6325 · EXECUTIVE 3-3260

FOR RELEASE: IMMEDIATE
June 8, 1961

RELEASE NO. 61-126

## NASA STEPS UP HIRING OF SCIENTISTS

The National Aeronautics and Space Administration has authorized its field centers to step-up hiring of qualified scientists and engineers.

Purpose of the accelerated recruiting is to fill existing vacancies and to anticipate manpower requirements of an expanded space exploration program.

NASA officials said the recruiting teams will interview those who are about to graduate from colleges and universities as well as recent graduates and experienced engineers and scientists.

NASA representatives last year interviewed nearly 3,000 persons on 100 college campuses.

Directed to intensify recruitment are: The Ames Research Center, Moffett Field, California; Flight Research Center, Edwards, California; Langley Research Center, Hampton, Virginia; Space Task Group, Hampton, Virginia; Marshall Space Flight Center, Huntsville, Alabama; Goddard Space Flight Center, Greenbelt, Maryland; and the Lewis Research Center, Cleveland, Ohio.

- END -

NEWS RELEASE
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
1520 H STREET, NORTHWEST · WASHINGTON 25, D. C.
TELEPHONES: DUDLEY 2-6325 · EXECUTIVE 3-3260

FOR RELEASE: Monday AM's
June 12, 1961

RELEASE NO. 61-127

# X-15 FLIGHT PLAN

EDWARDS, CALIF. -- A velocity build-up flight will be attempted in the X-15 research airplane within the next few days.

The mission in the rocket-powered X-15 will be under the direction of the National Aeronautics and Space Administration. The X-15 is a joint U. S. Air Force-NASA-Navy project aimed at obtaining data on aerodynamic heating, pilot control, atmosphere exit and reentry techniques, and psychological and physiological conditions experienced at velocities near 4000 miles-per-hour and altitudes above 50 miles.

The flight, programmed for a speed of mach 5.4 -- 3600 mph -- is primarily planned to investigate conditions which may be encountered during reentry from a high-altitude mission. Of particular concern to scientists and engineers will be stability and control characteristics of the X-15 at high speeds and high angles of attack.

The pilot of the next flight will be Major Robert M. White, veteran Air Force test pilot who will be making his ninth flight in the rocket-powered aircraft, designed and built by North American Aviation. White last flew the airplane on April 21, attaining a speed of 3074 mph.

The upcoming flight will begin over a point just northeast of Mud Lake, Nev., about 200 miles from Edwards Air Force Base, Calif., when the X-15 will be air-launched from a B-52 carrier plane at 45,000 feet altitude.

After lighting the XLR-99 rocket engine, White will hold 100 percent thrust for 75 seconds before shutting down the 57,000-pound thrust engine. His maximum speed will occur at this point.

From the 37-second point following launch, he will fly a zero-G flight plan for about 60 seconds, performing several maneuvers designed to provide stability and control data. Peak altitude on the flight will be about 115,000 feet with engine shutdown occuring near 100,000 feet.

The entire flight, power and glide, will last about 12 minutes. White will land the X-15 on Rogers Dry Lake at Edwards AFB following the research mission.

Temperatures of about 750 degrees F. are predicted for the flight.

Within the next few day, the number one X-15 will be returned to the program following installation of the 57,000-pound thrust power plant by North American. This is the aircraft which attained a speed of 2196 mph and an altitude of 136,500 feet in August of last year. It previously was equipped with two 8,000-pound thrust engines. Preliminary plans call for a checkout flight early in July.

A third X-15, designated number three, is still undergoing repair by the contractor following an explosion on the test stand last year. It is expected to be back in the program in September of this year.

- END -

NEWS RELEASE

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
1520 H STREET, NORTHWEST · WASHINGTON 25, D. C.
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RELEASE NO. 61-128

FOR RELEASE: IMMEDIATE
June 9, 1961

# EXPLORER VIII BACKGROUND INFORMATION

The Explorer VIII (1960 xi) satellite was launched by a Juno II rocket on November 3, 1960, into an orbit with a perigee of 275 miles and an apogee of 1450 miles. The satellite weighed 90 pounds and had a planned active life of two months. It was last heard from on December 27.

The Project was managed by Robert E. Bourdeau of NASA's Goddard Space Flight Center, Greenbelt, Maryland, and B. B. Greever, Juno II Project Manager, Marshall Space Flight Center. The experimenters - all from the Space Sciences Division of Goddard - were: Mr. Bourdeau, John L. Donley, Joseph A. Kane, Gideon P. Serbu, Elden C. Whipple, Jr., and Wesley M. Alexander. The electronic instrumentation was designed by the Spacecraft Systems Division of Goddard. The Marshall Space Flight Center was responsible for building and launching the satellite. Marshall Center's Guidance and Control Division provided mechanical design, power supply and satellite testing. The Goddard Space Flight Center Minitrack Network is responsible for acquiring and preparing the telemetered data.

The satellite contained ten experiments. Five were designed to study the ionosphere, a region surrounding the earth which acts like a mirror to radio waves. Three experiments were used to determine the characteristics of an ionized cloud which forms around the satellite because of its interaction with the ionosphere. This cloud has been a matter of concern to satellite tracking specialists because of its effect on radar echoes. The last two experiments were designed to study the characteristics of interplanetary dust particles.

The five ionosphere experiments were entirely new and were conceived by Goddard scientists. Four of these five depended upon techniques involving orbiting sensors which function as vacuum tubes without glass envelopes. The main difference between the Explorer VIII type of vacuum tubes and those in a television set is that there was no need to provide a vacuum seal since the near vacuum of space provides this naturally. The fifth experiment involved the measurement of electrons by studying the amount of detuning they produce on an antenna. These experiments counted the number of the electrons and positive ions in the ionosphere. This group of particles affect communications and should not be confused with the Van Allen zone particles. Data processed to date at Goddard Space Flight Center represents the most comprehensive study of the upper ionosphere through which Explorer VIII traveled.

The number of these particles have been counted as a function of time of day, and of latitude as far south as Johannesburg, South Africa, and north to the Canadian border. In general, it was found that the upper ionosphere is homogeneous, that is, it does not contain nearly as many disturbed regions as the lower ionosphere. Those in the lower ionosphere are responsible for disrupting communications.

Another type of ionosphere measurement involved determining the temperature of the electrons. Electron temperature was generally found to coincide with the temperature of the uncharged portion of the ionospheric gas. Temperatures of both electrons and the uncharged gas are important to meteorologists. The ionosphere experiments also determined the chemical constituents of the charged gas. Data processed to date shows that oxygen is the predominant gas at altitudes up to 650 miles where hydrogen then gradually assumes the leading role.

Another result from Explorer VIII wa the first experimental measurement of the shape and dimensions of an ionized cloud which forms around spacecraft. Data will permit theoreticians to determine the importance of electrical drag to the orbit lifetime of satellites. This ionized cloud formed mostly positive ions in the front of the satellite and negative electrons in its wake, extending back about one satellite radius. The effects which this could have on radar tracking and orbit lifetime are under study.

The cosmic dust experiments on Explorer VIII are producing results of major significance. One of the two dust particle experiments are entirely new satellite instrumentation. The other was an expansion of the Vanguard III micrometeorite experiment. By comparing data from Vanguard III with information obtained from Explorer VIII, a definitive picture of the numbers and size of these minute particles in solar orbit near the earth is emerging. Explorer VIII and Vanguard III data provides several thousand micrometeorite impact events while the total number of impact events of all previous measurements made by rockets and satellites is considerably less than one thousand.

Explorer VIII made a different measurement of a phenomenon first discovered by Vanguard III. On November 15-17, 1959, Vanguard III picked up a large number of micron-size dust particles. This has not been reported previously because the unraveling of data from the satellite has just been completed.

The indication from Vanguard III was that these particles could be associated with a major meteor stream. As many particles were detected during this 70-hour period in November, 1959, as were found during the remainder of the 78-day period of the satellite. Explorer VIII, in November, 1960, may have again seen this stream when one of its detectors sampled a different size range of particles than did Vanguard III. However, a complete picture is not available because of solar events during the same period. Data on the average number of micrometeorite particles which can be expected near the earth should provide information of great benefit to spacecraft designers who will have to determine how much protection will be necessary for instrumentation and man.

In addition to the geophysical data, Explorer VIII provided many advances in spacecraft technology that are important to the design of future spacecraft. A mechanism designed by Marshall Space Flight Center slowed the satellite's spin from 450 rpm (a value dictated by the Juno II booster) down to 30 rpm. The temperature of the satellite was controlled to within $\pm$ 10°C.

Most important, the Explorer VIII research program brought an unexpected dividend for future spacecraft application: a means of orienting a spacecraft without the use of optics. Several "traps" for ions and electrons were orbited. Any charged particles present entered these traps with the current flowing into a circuit attached to the collector. The current can be measured and thereby provides a signal from which the satellite orientation in space may be determined. There are several disadvantages of relying on optics to provide orientation information. The sun is not always visible when spacecraft are in the earth's shadow, for example. The same is true for the moon and specific stars. The traps, which essentially are angle of attack meters could also be used to point cameras and other devices in the proper direction. These devices do not have as great an accuracy as optical systems, but undoubtedly will find many applications.

Explorer VIII provided 500 separate pieces of information for every second of its active life. It is estimated that it will take another six months to completely process this volume of data. Goddard scientists are making the scientific data available to the domestic and international scientific community as readily as possible.

# NEWS RELEASE

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
1520 H STREET, NORTHWEST · WASHINGTON 25, D. C.
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FOR RELEASE: IMMEDIATE
9 June 1961

Release No. 61 - 129

## PRESS CONFERENCE
## EXPLORER VIII

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MITTAUER: I think we are ready to begin.

This is the results press conference on Explorer VIII satellite. You have fact sheets, I believe, with launch date and so forth.

We will begin with Mr. Stoller.

STOLLER: We are glad to have the opportunity to give you a report on what has been so far found in the reduction of the data from Explorer VIII. Explorer VIII was one of the satellites in the Juno II series. It is one of the satellites in the total scientific satellite program, particularly devoted to a study of the ionosphere.

I won't take any of your time. I would like to have Dr. Clark tell you something of the place of Explorer VIII type of measurements in the ionosphere program as related to measurements by other techniques, before we pass to the specific results that Mr. Bordeau, Mr. Alexander and some other of the experimenters who are here with us can tell you of the flight. Mr. Greever, of course, can tell you about the mission operation if there are questions in that area.

I will pass it to Dr. Clark.

CLARK: There are two general types of satellites. One is the application satellites, typically the meteorological and communications satellites. The other broad area is the scientific satellite area, of which this is one.

On scientific satellites there are two major areas of interest. One is the astronomy astrophysics area, of which the gamma ray Explorer XI telescope was a good example. The other was the geophysics area which, broadly speaking, includes the disciplines of aeronomy (neutral atmosphere), energic particles and fields.

In the ionospheric physics area, in which Explorer VIII is located, the rather traditional means of study of the ionosphere was by means of radio propagation techniques. This was exploited rather vigorously since 1946 in the sounding rocket program.

The novelty of Explorer VIII is that it is, in effect, the first of a series of satellites in the direct measurements area, in which the medium in the immediate vicinity of the satellite itself is sampled by various types of gauges that the men from Goddard will speak to you about, and information is then telemetered back through the conventional radio link.

This is all of the time that I would like to take. I would like to turn it over to Mr. Bordeau, who has already been introduced to you, who is responsible for the ionosphere experiments of the Goddard Space Flight Center and Project Manager for Goddard in the experiment.

BORDEAU: As the release indicates, the main mission of Explorer VIII was to study the ionosphere in an altitude region about which we had little information before launch. Let me first of all define the ionosphere as that region of space which is so little ionized that it affects communications.

Before Explorer VIII went up, all we had was scattered information about the number of charged particles that are in this altitude region. Some of these results were obtained from things like moon echoes, and a few scattered points of information from some Russian data. Beyond that we had some theoretical guesses as to how the number of electrons with altitude were distributed. As a result of Explorer VIII we feel we know a lot more about this region.

There were essentially ten experiments on Explorer VIII, two of which were micrometeorite experiments, and I think Mr. Alexander will brief you on those. There were five ionosphere experiments. If I can just list them briefly, I will tell you what they do.

One is what we call a radio frequency impedance probe. This merely means that you measure the match that an antenna has with the medium and from a theoretical equation you can count the number of negatively-charged particles which we call electrons, as a function of your position in space.

We must differentiate here between the electrons which Explorer VIII measured and the ones that make up the Van Allen Belt. They are entirely different. The ones we are talking about affect communications. That is the first experiment.

The next four that I will list give data by similar techniques. By slightly twisting the experiment around each time you can get a different measurement.

The second one, similar to a vacuum tube technique, counts the number of positively-charged particles as a function of the position of the satellite in space.

The third one tells you something about the chemical constituents in space, whether you have hydrogen or oxygen. These are important because they tell us something about how the ionosphere is formed. We know that the sun plays a strong role in forming the ionosphere. If you know the chemistry, then you can tell more about exactly how these interactions take place.

The last two experiments measure the same thing. I mentioned the temperature of these electrons.

The other two experiments were designed to tell us something about an ionized cloud which forms around the satellite due to its interaction with the atmosphere. There had been some worry on the part of tracking specialists and people who were worrying about drag on the satellites, whether or not this ionized cloud which forms about the satellite will either affect your tracking accuracy or whether or not it affects drag appreciably.

I would like now to summarize as briefly as I can the findings that we have obtained in the ionosphere and relative to this ionized cloud.

QUESTION: Pardon me. You mentioned ten experiments. It seems to me that you have enumerated only nine.

BORDEAU: Excuse me. There were three experiments that told us something about the clouds. I believe I said two; that should be corrected to read three.

Overall I feel that the satellite was 95 percent successful in that we got data from nine of the ten experiments. The tenth experiment, which we call electron field meter experiment, all we learned from it is how to better design the instrument the next time we fly it, essentially.

We did get a small bit of geophysical data, but to give you an analogy, it was in a saturated condition from months of flight. We counted the number of electrons and positive ions as a function of latitude and time of day. We feel that we have the largest body of data which tells us the difference between a nighttime ionosphere in this altitude region and the daytime ionosphere.

We found that oxygen is the main constituent in the lower part of the altitude region through which we flew. This is an indication that what is going on is that the sun is producing these oxygen ions at altitude and that they are drifting up through the altitudes through which we flew.

We successfully measured temperatures. Generally they are running close to the neutral gas temperatures which people have been measuring by observing how much drag we got.

We measured the dimensions of the ionized clouds surrounding the satellite and found that in dimensions at least it was equal to about the physical dimensions of the satellite; that it increased its electrical dimension by a factor of 2, is one way to put it.

People who were worrying about electrical drag can use the data that we have obtained to derive a theoretical equation to deduce whether or not this will significantly bring down a satellite sooner than it normally would if you didn't have any electrical effects.

That is generally the summary of the ionospheric results, unless I have left something out.

QUESTION: There had been no results yet from that kind of theoretical study on the drag?

BORDEAU: No. This part of the program is under study at the moment.

QUESTION: And I don't suppose that you know yet whether this electrical drag effect is linear? In other words, does it double the size of Echo I just as it doubled the size of this thing?

BORDEAU: I would suspect that it would double the size of Echo I, electrically speaking, just like it did here.

I might expand on that a little bit. We would expect that you would get a different type of reaction in the higher altitude regions than what we flew through.

QUESTION: If you were then to measure something like Echo I with radar equipment, would your measurements show twice the diameter of that vehicle?

BORDEAU: Not necessarily, because what I just mentioned was the thickness of the cloud. You also have to concern yourself with the number of particles that are within this cloud. They could be fewer in number than the ionosphere that surrounds you.

So you have to worry about both the size and the density of the particles in the cloud. Just because it is twice the size doesn't necessarily mean it will give you twice the radar cross-section.

QUESTION: There is a cosmological theory, I believe, that as a heavenly object like the sun goes through interstellar space it sweeps a path out for itself. Is this analogous to that? It attracts the matter and brings it in close to it?

BORDEAU: This is a complicated phenomenon. Generally you will get this type of reaction from any body that is traveling through an ionized medium, and the conditions will change whether the body is conducting or whether it is non-conducting. We had a perfect conductor up there.

QUESTION: I am wondering if this thing, as you might say, tunnels its way through the ionosphere as it goes along, collecting a little cloud. Is that what happens?

BORDEAU: Yes, essentially.

QUESTION: It tunnels its way through the ionosphere.

QUESTION: When you speak of upper and lower ionosphere, could you give us that in miles?

BORDEAU: Yes. The lower ionosphere generally runs between 50 miles on out to 300, and those numbers can change, depending upon the solar cycle and the seasons. But those are about the rough limits. The upper ionosphere is above 300 miles, and it depends on how you want to define it. The things of major interest would happen out to an altitude of 2,000 miles. But the entire region of space is ionized beyond that. So if you want to use the term loosely, the upper ionosphere is above 300 miles.

QUESTION: You said that these were not to be confused with the Van Allen electrons. But at apogee you are getting Van Allen electrons, aren't you, in this thing?

BORDEAU: The difference is that we are measuring particles that are traveling real slowly, and there are around 10,000 more of these particles for every one of the Van Allen particles which are traveling so much faster.

QUESTION: You are just not measuring the Van Allen things, but you are out there part of the time with them?

BORDEAU: That's right. We were in the belt.

CLARK: You might say that the electrons of the Van Allen Belt are, of course, the same as the electrons in the ionosphere. But there are too few of the Van Allen electrons to influence radio propagation, whereas, the large number of electrons in the ionosphere have too low a velocity to provide the energetic particles to affect the characteristic of the Van Allen electrons which are moving more rapidly.

QUESTION: But the electrons are not the significant thing here. You are measuring things of lower energy.

CLARK: Correct.

BORDEAU: The one thing of general interest here, when you are talking about the lower ionosphere, it is generally known that when you have sun spots, for example, you get radio blackouts and that sort of thing. There was a question in people's minds as to whether this sort of thing was also going on in the upper ionosphere. Generally we found that the upper ionosphere was relatively undisturbed, that most of these effects are occurring in the lower ionosphere, and that this is where you should look for difficulties with radio communications due to sun spot activity.

QUESTION: With reference to these five ionosphere experiments, it says at the bottom of the first page of the hand-out, "Four of these five depended upon techniques involving orbiting sensors which functioned with vacuum tubes without glass envelopes."

I wonder if one of the experts could draw us a little picture of what this means.

BORDEAU: I think Mr. Whipple could do this for us. Actually, I believe we have what they look like on the model here.

WHIPPLE: Perhaps you can look at these. There is one sensor here which doesn't have a cover plate on it.

Let me draw a quick sketch on the board.

QUESTION: Is this the first time you have ever used the vacuum of space for this purpose?

BORDEAU: No. We are not that naive. There were new experiments, as the release says, new experiments as space physics go. But we were careful enough to try to experiments on a small relatively inexpensive sounding rocket to make sure our physics were proper before we committed them to a satellite.

QUESTION: So it is the first satellite to carry out this experiment?

BORDEAU: The Russians used an experiment similar to one of the five I mentioned here, on the Sputnik III.

QUESTION: That is, relying on the vacuum of space?

BORDEAU: Yes.

WHIPPLE: If this heavy line here represents the outer surface of the satellite, then the sensor, which we refer to as a trap, consists of one or two grids, depending on which sensor it was, with a collector behind these grids.

What we did was to apply a voltage to these grids or to the collector. The size of the voltage and polarity depends on the type of particle we are interested in measuring. Some particles get through, others do not get through but are turned around, depending on the size of this potential and its polarity.

We measure the particles that do get through and that are collected by this plate behind the grids. We measure the current that results, and this is what was telemetered to ground to current.

What we are doing is interrupting the values of these currents as a function of these potentials, and this gives us the information that we want.

QUESTION: As I understand it, when you have a hot filament type tube in a radio set or television set, you have to provide it with a little package of vacuum because if you didn't it would burn out. Is that correct, essentially?

WHIPPLE: That is correct.

QUESTION: So when you send this thing up to where you have a vacuum, you don't have to put this little package of vacuum around it. But you launch this thing from atmospheric pressure, and where you don't have a vacuum, what do you do? Do you start this working after you get it up to altitude?

WHIPPLE: The reason the vacuum tube needs a vacuum is because they provide -- Let me put it this way: The source of the electrons in a conventional vacuum tube is usually a hot filament. If there is air present, the filament burns up when it gets hot. Here we are not depending on a filament; we are depending on the particles that are already present in the atmosphere. We don't have any filament, so there is no danger of it burning up.

QUESTION: So that the thing is in a working mode at the time that it leaves the ground; is that the idea?

WHIPPLE: That is correct.

cl QUESTION: May I pursue this idea of the cloud a little further. Is the idea that electrons have greater mobility and therefore they will impinge more often on the satellite and create a negative charge on the satellite?

BORDEAU: That is correct. The electron is smaller than the positive ion so it gets to the satellite first. So you develop a negative charge on the satellite.

QUESTION: You described the difference between the upper and lower ionosphere in terms of miles. Can you give it to us in terms of layers, D, E, and F?

BORDEAU: Yes. Do you want it in miles? I usually talk in kilometers. There is the D, E, F-1, and F-2 layers, and above that the upper ionosphere.

QUESTION: In other words, those three lettered layers are what you call --

BORDEAU: D, E, and F are the classical layers.

QUESTION: Are you calling those the lower layers?

BORDEAU: Those are all in the ionosphere. We flew above these layers.

CLARK: The border which Mr. Bordeau has been using is the peak of electron density in the F region, so-called F-peak or F-max as the boundary between upper and lower. It runs anywhere from something like 180 to 300 miles, depending on season and sunspot activity.

QUESTION: Then at 275 miles you were barely scraping the upper level of this F-2 maximum?

BORDEAU: Yes.

QUESTION: How could your experiment then provide information about the condition of the lower ionosphere?

BORDEAU: Some of it is by deduction; the fact that we got plus oxygen, for example. Just from that result alone we can deduce where this was formed by comparing it with results from rockets that have flown in the lower ionosphere.

c2 QUESTION: If there is a chemist in the group, I wonder if he could explain why oxygen should be the predominant gas at altitudes up to 650 miles, while nitrogen is the most plentiful component and lighter than oxygen? Why wouldn't nitrogen be your predominant gas at those altitudes?

BORDEAU: Mr. Whipple, do you want to kill that one?

WHIPPLE: I think we should distinguish between the ionized constituents of the atmosphere and the neutral gas. The neutral, the major component of the neutral gas is nitrogen, at least up fairly high. Whereas the kind of ion you will find depends on the neutral atom, which is most easily ionized, and it turns out that oxygen will be ionized more easily than nitrogen, therefore it is the most plentiful one.

QUESTION: Then up at those altitudes you have a substantial amount of un-ionized nitrogen; is that correct?

WHIPPLE: That is correct.

QUESTION: Molecular nitrogen up there, as opposed to ionized oxygen; is that the story?

BORDEAU: This is something we didn't measure on Explorer VIII.

QUESTION: I say up there you would have molecular nitrogen. You would have it in the $N_2$ form floating around up there with its electrons still attached.

WHIPPLE: Right.

QUESTION: As opposed to ionized oxygen.

WHIPPLE: Up to about 600 -- I am thinking in terms of kilometers, but I can compute it in miles -- the percent of ionization, in other words, the number of ionized atoms is only a small fraction of the total number of molecules. So that even your oxygen molecules, your neutral oxygen molecules, have not been diminished in great quantity and will be practically all there, and just a few ionized.

QUESTION:

That answers another question that I had; namely, is there a lot of un-ionized gas up there at those altitudes?

c3 WHIPPLE: Yes, there is.

CLARK: You can take that one step further in that you have the concept of a scale height which is directly proportional to the temperature and inversely proportional to the mass. When the oxygen dissociates, when you have atomic oxygen, and then ionized atomic oxygen, this is now lighter than the dominant molecular nitrogen. Therefore, the oxygen scale height is larger, therefore it decreases less rapidly with height than does the nitrogen. So there comes a cross-over point at which the atomic oxygen actually will be dominant over the molecular nitrogen. I am not sure what it is, but it is below a thousand kilometers.

BORDEAU: There were some results that have nothing to do with the physics of space that came out of Explorer VIII. These are related to spacecraft technology. They came out of the work of Mr. Whipple. One of them has to do with the effect of the earth's magnetic field on the orientation of a satellite. We measured this effect. This has implications on orientations of satellites, like TIROS. That information can be used in addition to the data already gotten from TIROS II, to assist them in correcting for this sort of an anomaly.

QUESTION: You can determine that because the electrons are generally in line with the earth's magnetic field, and therefore you have that as your base on which to judge how the satellite is oriented?

BORDEAU: Whenever you have a conducting body moving in a magnetic field, you would expect torque, an electrical torque of this sort.

I think we can turn this over to Mr. Alexander, who can summarize the results in the micrometeorite area.

ALEXANDER: We had two experiments on Explorer VIII to measure properties of dust particles near the earth. One of them was an expansion of an experiment we had on Vanguard III, and the type is also flown on some other space vehicles. The other one was a new experiment to fly on a satellite.

These two experiments were, first, the sounding board with a microphone on it -- that is the reason we call it a sounding board -- which responds to impulse delivered to the plate when it is hit by one of these very small c4 particles moving at a very high velocity.

The other sensor was what we call a photomultiplier tube that was opaque, would not see the sunlight. We put a very thin film of aluminum on it. Then when the particle, a very small particle, hit the face of this photomultiplier, a flash of light occurred as part of the impact event and the photomultiplier could look at the amount of flight energy that was emitted by this particle when it hit. This was the new sensor that had not been on a satellite. It had flown in rockets, more than one rocket, but had not been on a satellite.

The results that we are seeing from our experiment, two things we feel are quite important. They will become more important when we bring in, in terms of the microphone sensor, results from Vanguard III, which are the two satellites we have had since Goddard was formed. One is that for the first time we are getting a large number of impact events in which we can start to get a rather definitive picture of, say, take a given mass size, and how many of them are there; and then another mass size, and how many of those. We are getting points on a plot like this for the first time in which we are talking about several thousand events.

Prior to these two vehicles we were sketching information when we were talking about tens or a few hundreds of events. In fact, I think if you took all of our work prior to these two and totaled up the total number of events appearing, it is less than a thousand.

So we are starting to get what looks like a definitive picture. There are very small particles that are moving at high velocities in the vicinity of the earth.

The other aspect of this thing, also I refer back briefly to Vanguard III, this has not been reported until right now, and in fact we just finished unravelling data of what we would call a rather special event, and we are just submitting this to the scientific journals, and also it fits here, and that is that the satellites, both of them, were up during November 1959, one, and 1960 on the other. In November we saw in Vanguard III a rather high count rate for a short period of time, approximately three days. To give you an order of magnitude, if we can take the number of events that we saw for these three days on Vanguard III, and this was as many events as we saw in the other 75 days on Vanguard III.

c5 This appears to be associated with what we call a major meteor stream that occurs in November. We know about meteor streams. This idea is not new because the large particles have been detected by the telescopes and radar and this type of device.

You can look at it theoretically in several ways. Some people would predict that we would not find small particles in these major meteor streams. We think now that there is one major meteor stream that appears to have a fair amount, at least in November 1959, of small particles.

In November 1960 our satellite Explorer VIII was also up. We come to the time that we should see this stream again and I have to make this kind of statement, and I will tell you why. We appear to possibly have also seen this stream again. If you remember, there was a rather spectacular solar event between something like the 12th and 20th of November, with different prominences occurring. The particular sensor that could have seen this stream could have been affected by the solar event. We have indications both ways. We can argue both ways.

It will take us longer than we had anticipated to unravel the information in 1960 from Explorer VIII, but we appear to have seen small particles for a period of about 70 hours on both Vanguard III and Explorer VIII. We are not definite about Explorer VIII until we have had a fair amount of more work. But it was something that was a little different, so to speak. We did find them in this stream.

We will have an opportunity -- we haven't gotten the data in -- to see another stream in December with Explorer VIII -- I wish I had it in hand now, but it is not quite in our hands -- that could be a suspect for some more very small particles.

QUESTION: Was this November 3, 1960 launching date selected in part at least because you wanted to get this comparative information for the November shot?

ALEXANDER: It is more fortunate for this reason: This event that we saw on Vanguard III, we got all the way through the tapes on Vanguard III. It looked like there might be something in November. This generated enough concern to look for this that we started a program to develop special equipment to look at over twice the number of tapes c6 that had already been given on Vanguard III for this particular reason, and the gentleman who did it had to look down in the noise of the telemetry signals and pull it out, and the boys came up -- it took them several months to do it, but they did come up with very definitely being able to give us twice the information for this time that looked special than we already had.

The qualitative indication that yes, you got something in the middle of November, occurred around launch time. So we were extremely happy that this vehicle was flying in November of this year. It was simply a time factor because we had to develop special equipment.

QUESTION: Would we be correct in saying that this was a hitherto undiscovered or hitherto unsuspected stream of meteors that was discovered as a result of these two flights?

ALEXANDER: Let me say that the stream has been there for some time, these large particles. It depends on who you would talk to as to whether they would believe any small particles are in these major meteor streams.

QUESTION: Does this have a name like Leonid?

ALEXANDER: You have just named it.

We use the words, "associated with." It depends on who you were talking to as to whether they would think there would be small particles in a major stream. Our equipment was able to detect very small particles and we were in the stream, and now we see they are there and we are trying to figure out the physics that are involved as to why they are there.

QUESTION: Would you care to hazard a guess as to what this kind of a shower might do to, say, an Apollo type satellite in orbit at that altitude for a long period?

ALEXANDER: To start with, it is a short time in any stream. That is Number One.

In Vanguard III, it could detect a particle of a particular size and larger. So it gives us one point on the graph. S-30 we instrumented to get three points on a graph, spread apart by a factor of 10 each point, so we could then tie Vanguard III with it and get a fair spread. This, to start with, gives us an idea of the slope.

We had one other thing on Vanguard III that has an impact here, and that is that there was a puncture experiment in that there were two pressure zones on this ball, if you remember. The area that these zones were sensitive to was not quite that of the microphone, but it was large, two or three tenths of a square meter.

The pressure between these two zones -- There was a pressure gauge between the two, they started out at different pressures and then we could monitor the pressure changing for the whole 78 days. These two zones were not punctured. The thickness of the particle involved in Vanguard III is between 20 and 30 mills. If you take the number of particles that we had from the microphone size particles and go down to a larger one in terms of this stream alone, depending on what kind of slope you take, you would say had we gotten hit by one it might have punctured it. It wasn't punctured, so that is good information.

In a meteor stream how your numbers versus mass goes, we don't know that yet. Explorer VIII data for us may definitely help. In other words, you may have an entirely different distribution of masses in a meteor stream than we see way out in space in individual particles. This we don't know well, except those zones were not punctured in that time nor in the 78 days. You can look at it both ways.

QUESTION: I wasn't thinking so much of the possibility of the skin of Appolo being punctured by a meteorite as I was of a cumulative sand blasting effect that might change the heat transfer characteristics or radiation characteristics.

ALEXANDER: These size particles, unless you get to very long lifetimes -- when I say long, I am thinking of at least a year, maybe longer -- your sand blasting is going to come from even smaller than these, because you have enough of them. You have got to get these things concentrated in a large number in a square millimeter, this type of thing.

MATHEWS: That experiment was also on Vanguard III.

ALEXANDER: We had an erosion experiment. It did not change, either, in terms of very small ones.

QUESTION: Would you define large and small?

ALEXANDER: I use this number for you. Whether you want pounds or grams, I am not sure. It is easier for me to say grams. I will relate it to pounds.

The sensitivity point on Vanguard III, for instance, was one billionth of a gram. Divide that by five hundred and you will get approximately a pound figure.

On Explorer VIII our most sensitive point for the microphone was between one billionth and one-tenth of a billionth of a gram, and then went up by a factor of ten. So we can say less than a billion, or ten over a billion, and then a hundred over a billion. So these are the points.

You get into puncture trouble, however, in particles not very much larger than that, in terms of knocking a hole in something. That particle $10^{-9}$ no one expects is going to puncture twenty mills of material. But you don't have to get too much larger before people start to worry about it.

Our group at Goddard does not investigate the engineering aspects, though we know and work closely with people concerned with this within NASA.

QUESTION: You referred to the meteor stream of large particles and the fact that small ones existed in it. Does this $10^{-9}$ just hold true as the dividing line between large and small?

ALEXANDER: This would be quite small. A large particle we would say, the kind that you see with the ground-based detecting device, telescopes, photographic, both visual and photographic, and radar, are at least larger than 1/10,000th of a gram or larger. So we are almost a millionth smaller than that. We are quite a ways away from the ground-based data.

QUESTION: What diameter is associated with these particles?

ALEXANDER: If they are solid particles, then our $10^{-9}$ gram would be in the neighborhood of 5 microns, 4 to 5. Our photomultiplier sensor would detect a 1 micron particle or even smaller than that, which is a million-millionth of a gram.

QUESTION: I believe Dr. Van Allen asked you at an interplanetary meeting, how did you know they are micrometeorites. How do you know?

ALEXANDER: These are impact sensors. It depends upon an impact being there. A hole is not being punched. A person feels more comfortable, if he had something, not a piece of metal, but something very thin, and a hole occurred in it, and you could detect the hole with a light-sensing device or something, you would feel that you got hit. This was on Vanguard III. It was a very small area, 6 micron milar with aluminum over it. It also was on Explorer VII. Vanguard III and Explorer VII were up at the same time. So you might consider it one experiment, maybe.

We think that we have seen a hole in one of those sensors on Explorer VII.

When you run this route, that you take the combined area of Vanguard III and Explorer VII, of this milar skin, and then take a microphone, from the microphone data you would get one hole. It is pretty poor statistics for one event. It fits the picture pretty well.

The other answer to your question: We went to extremely elaborate procedures, especially on Explorer VIII to try to do everything we could possible to make the microphone system as a whole, sensor, electronics and payload, extremely quiet, so that we would have a fair degree of confidence level.

An example of that is that we set the requirement, and the payload manager was very gracious, and we had to work hard to do it, but that payload wouldn't fly until we had 24 hours of continuous operation of the satellite, including the transmitter, and no counts being detected from the system. This meant that we worked out all payload interference problems in terms of the gear, and then put the 24-hour requirement on. So we have that kind of confidence level about it.

The only thing we don't know anything about that would give us false information, so to speak, counts within the system, is a thermal problem, temperature changing.

That sounding board you will notice, if you will look at the satellite over here, is acoustically isolated from the rest of the payload.

Two, you will notice paint, a particular kind of paint on the back of the payload skin and the back of the sounding board to try to thermally couple it as well as possible to the skin of the payload, so that its temperature didn't vary wider than the skin varied.

Lastly, you would look at your data in the orbit. You go through a thermal cycle every orbit. The cycle may differ some a little bit, especially during the lifetime of a satellite. But if you found that your rate over several days, especially, was pretty even, you would start to worry, and say that I have thermal noise. But we have cases where we can go a whole orbit with no information at all. In fact, that is one of the things that we plot, how many orbits do we have with zero counts. This is a definite indication that we don't have a thermal problem.

QUESTION: What proportion was it?

ALEXANDER: This depends. We have found we have 25 or 30 percent of the passes in November that we have our information.

BORDEAU: I would say we have gone through something like 30 percent of the November tapes is what he is trying to say, which would amount to about 15 percent of the total data gathered, because we had two months of active life.

ALEXANDER: Whenever we find a case where we got a reading once per orbit on two successive orbits, then we see how many counts are there. We like to see counts there, but we also find that we do have some orbits with zero counts. If you had only once, this wouldn't be much of an indication. But we do have a number of these. So this puts up our -- I can't tell you exactly. This puts our confidence level back up a little higher even that we are seeing counts.

QUESTION: What would the zero counts indicate?

ALEXANDER: Zero counts I am saying indicate we do not have thermally-caused pulses.

QUESTION: Doesn't it also indicate that the satellite is not being hit by anything?

ALEXANDER: Then of course that means that the information we are getting is an impact, meaning no impact in that two-hour period.

QUESTION: No, no. What I mean is what does it indicate when you have no impacts? That nothing is hitting it?

ALEXANDER: That is it. During that two-hour period. We don't have a day in which there are no impacts.

QUESTION: This thing lasted for 54 days. What finally knocked it out of commission?

BORDEAU: We did not go for a long lifetime on this satellite, mainly because we were afraid that if we had put solar cells on it that there was some gap in our knowledge as to the effect of the solar cells on a scientific experiment, and we felt we wanted to get a small amount of good quality data rather than a large amount of poor quality data. So the satellite was powered by chemical batteries, and that is the reason why it had only two months of active life.

QUESTION: I thought the squares were solar cells.

MITTAUER: If I may break in. I don't want to cut you off. I have Bill Greever, who I would like to ask what comments he has, if any, on the Juno II shots, to get him officially on the record, and Mr. Mathews, on the satellite itself, the shell and so on, if they have any comments, or if you have any questions, Bill? After this, as far as I am concerned, more questions if you still want to go.

GREEVER: The mission on this shot was extremely uneventful. Everything went very smoothly. The vehicle performed exceptionally well.

MITTAUER: Mr. Mathews, do you have any comments on the performance of the satellite itself?

MATHEWS: About all I can say is that the satellite was probably one of the more complex, electronically, of the satellites that had been put up up to that time, and apparently all of the satellites performed normally through the anticipated life which was within very close to the estimated life, which was about sixty days, and it lasted about fifty-four. The power drains do change slightly with time, so we can certainly consider it a normal operation.

QUESTION: What are you going to do next along this line?

BORDEAU: As far as the ionosphere experiments of this nature are concerned, the trend which Mr. Serbu, Donley, and Whipple are taking is to take these five or six instruments and to make one single instrument out of them and to use the time-sharing device and to fly them on things like the Echo satellite where you go out further into regions of space, and any other satellite that he can get a piggyback ride on. That is the plan at the moment.

QUESTION: You might put some of these experiments on "streetcar" satellites, too, is that right?

BORDEAU: Yes, that is right.

CLARK: In a very real sense the United Kingdom Scout, going early in 1962, will be the follow-on to Explorer VIII, because the British experimenters will be able to take advantage of it, which has been gained in order to make changes in the instrumentation, that will give them a better quality data.

QUESTION: The British are going to use one of our Scouts?

CLARK: Yes.

QUESTION: That is from Wallops Island?

CLARK: Yes.

MATHEWS: They are here now with a payload with us.

QUESTION: What are those experiments?

CLARK: This is the United Kingdom so-called S-51.

BORDEAU: It contains experiments similar to what Explorer VIII has.

QUESTION: It will be a completely UK-made payload?

CLARK: No.

MATHEWS: The satellite structure, the electronics, the power supply, the basic satellite itself, is being done here. The British are supplying the sensor elements for the satellite. They are also supplying some of the electronics that are associated directly with the sensors themselves. We are supplying the basic, the tape recorders, transmitters, channel receivers, power suppliers, antennas, structure, that sort of thing is being done by Goddard. They are working closely with us. They have three of their primary experimenters here now.

The first one we feel is more or less a training program for the British. We will help them very carefully with the first one. After that we expect them to take on more and more as they go on with the program.

QUESTION: They have gone so big with the high-altitude sounding rockets so long, why do they need a U.S.-training program to get proficient?

MATHEWS: It is a little different problem when you get into space. Remember there is a big, big difference in the lifetime of a sounding rocket and a space object which affects your electronic reliability, the temperature control problems, all of those things.

QUESTION: I wonder if someone would describe this orientation device.

BORDEAU: Mr. Whipple and Mr. Donley, mainly Mr. Whipple, deduced this from the data. Maybe Mr. Donley could describe how this orientation device works.

DONLEY: This orientation device was sort of an extra bonus. It wasn't a primary experiment. It came as the result of the ionosphere investigations.

One of these ion traps in particular, what we call an ion current monitor, counting the number of ions, we found is sensitive to the velocity vector. In other words, as the satellite, essentially as the trap goes forward, it counts ions. When it looks away, there is a dearth of ions, hence no indication. If we use this we can tell when the satellite is, a certain portion of the satellite, looking forward. A sort of angle of attack meter. By combining this with a directional characterization of the electronic current or emission of electrons off the surface due to solar radiation, we can come up with the orientation of the satellite by measuring these ionosphere currents, or properties of ionosphere, completely independent of the horizon data or solar data as such.

We need a little bit of information about the solar, but we can get this from the orbital information and velocity vector information, from the tracking data.

QUESTION: You would have to use this as an input to some kind of a reaction mass thing to actually orient the thing? This determines the orientation but it doesn't orient it?

DONLEY: That is correct. You would have to feed some sort of servo mechanism and would serve as a correction device to give you the correction signal, the error signal.

QUESTION: Instead of using the horizon sensor as you did on the Agena, you would use this. Might this be applicable on the Nimbus?

DONLEY: It could be applicable to the Nimbus. Of course, they are using their horizon scanners I believe.

BORDEAU: Whether or not it is useful depends on the accuracy you want in pointing. This system does not have, at the moment, a high accuracy.

QUESTION: How accurate is it?

DONLEY: I would say our best accuracy here is on the order of five degrees.

QUESTION: Of yaw angle or velocity vector?

DONLEY: Yes. The sensitivity varies as a cosine function. So it is only as good as you know the cosine function as it stands now. Maybe improvements could be made to make it more accurate. Certainly it doesn't have the inherent accuracies of optical systems.

WHIPPLE: It could be improved up to about a degree accuracy.

MITTAUER: Are there any further questions? It has been almost exactly an hour.

Thank you very much.

(Thereupon, at 3:35 p.m., the Press Conference was adjourned.)

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JOINT NASA AND CANADIAN DEFENCE RESEARCH BOARD RELEASE

RELEASE NO. 61-130 HOLD FOR LAUNCH

Two 75-foot antennas, similar to those which will probe the ionosphere next year from the Canadian Defence Research Board's (DRB) top-side sounder satellite, were extended successfully 600 miles above the earth during an evaluation experiment late yesterday afternoon.

The metal, tape-like antennas were part of an instrumented Javelin rocket nosecone launched from the U.S. National Aeronautics and Space Administration's (NASA) Wallops Island Space Flight Station on the Virginia coast. Successful extension of the unusually long antennas now clears the way for the final construction phases of the satellite flight models.

Purpose of the experiment was to confirm the feasibility of extending long satellite antenna systems in outer space by a mechanism which operates like a coiled steel-tape rule. NASA scientists directed the launching of the four-stage rocket and manned tracking stations to plot the trajectory of the payload which fell into the Atlantic Ocean 300 miles from the launching pad. Recovery was not planned.

The Javelin's payload was 19 inches in diameter and weighed 84 pounds. The long antennas were designed jointly by the Electronics Laboratory of the Defence Research Telecommunications Establishment (DRTE), of Ottawa, and De Havilland Aircraft of Canada Limited. A telemetry transmitter near the center of the payload, including small antennas, provided flight and related data to NASA ground stations.

Before the antennas were extended internally by means of a radio command, the payload was spun up to 650 revolutions per minute. Following their extension, the spin rate was decreased to 135 r.p.m. This permitted evaluation of the ability of the antennas, as a mechanical system, to withstand the forces experienced during their extension from a spinning vehicle. The test was necessary because the satellite will be stabilized in space by a spinning technique.

As a secondary experiment, during the payload's descent and before it re-entered the earth's atmosphere, the effects of polarizing voltages on the performance of the antennas were determined. These voltages tend to reduce the effects of the ionosphere by repelling its charged particles. In close proximity to the antennas, the ionospheric particles can alter the latters' characteristics markedly.

The Wallops Island experiment formed part of the joint NASA-DRB satellite project established last year. Under construction to probe the top layers of the ionosphere from above, the satellite will continue to be called the "S-27 Top-side Sounder" until it achieves orbit successfully early next year. It will then be known as the "Alouette", the French-language name of a high-flying songster of the lark family which remains at high altitudes for lengthy periods.

Leader of the DRTE team at Wallops Island was Dr. A. R. Molozzi, formerly of Georgetown, Ont. Closely associated with the antenna design group of De Havilland was John Mar, formerly of Port Alberni, B.C.

- END -

# NEWS RELEASE

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
1520 H STREET, NORTHWEST · WASHINGTON 25, D. C.
TELEPHONES: DUDLEY 2-6325 · EXECUTIVE 3-3260

FOR RELEASE: Thursday AM's
June 15, 1961

RELEASE NO. 61-131


## FOUR COMPANIES SELECTED FOR SATURN S-II BIDDING

NASA today invited four companies to submit detailed proposals on the design, development, and production of the Saturn S-II stage.

The firms are Aerojet-General Corporation, Douglas Aircraft Corporation, General Dynamics-Astronautics Division, and North American Aviation, Inc.

This is the second and final phase of a procedure to select the prime contractor for the S-II -- to date the largest rocket unit to be undertaken by U.S. industry.

The S-II will be the second stage of the advanced Saturn which will have several times the payload capability of the Saturn C-1. It will be able to lift the three-man Apollo spacecraft to escape velocity and could be used for circumlunar flight.

It will be powered by four J-2 liquid hydrogen-liquid oxygen engines already under development by Rocketdyne Division of North American. The stage will have an altitude thrust of 800,000 pounds.

Present plans are aimed at a target date for first flight of the advanced Saturn with the S-II in late 1964 or early 1965.

Thirty firms attended a pre-proposal conference April 18 at the NASA Marshall Space Flight Center, Huntsville, Ala., the organization managing the Saturn project.

Of the thirty, seven submitted general proposals May 11. On the basis of these proposals, four companies were selected to draft detailed proposals for building the stage.

The four firms have been asked to attend a final proposal conference June 21 at which time they will be given information needed in the preparation of the proposals with regard to both technical approach and cost of the project.

After the proposal conference, the firms will be given about a month to prepare their proposals. Present plans are for evaluation and negotiation to follow so that a contract can be signed by October 1.

- END -

NEWS RELEASE

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
1520 H STREET, NORTHWEST · WASHINGTON 25, D. C.
TELEPHONES: DUDLEY 2-6325 · EXECUTIVE 3-3260

FOR RELEASE: Monday PM's
June 19, 1961

RELEASE NO. 61-132

# AWARD BACTERIA STUDY CONTRACT

The National Aeronautics and Space Administration has awarded a $16,900 contract to National Research Corporation, Cambridge, Mass., to investigate the effects of simulated space environments on the life of microorganisms.

The program calls for studies of at least six representative species of common earth bacteria to determine their ability to survive such hazardous space conditions as ultrahigh vacuum, ultraviolet radiation, temperature and desiccation for varying periods of time.

The microorganisms will be subjected to the ultrahigh vacuum range of $10^{-10}$ Torr (millimeters of mercury) which is equivalent to the very low pressures encountered at orbiting altitudes beyond 500 miles.

It is believed that the ability of common microorganisms to survive in the space environment may influence the preparation of future interplanetary probes.

A smaller NASA-funded study, already completed at NRC, indicates that at least three species of hardy bacteria can survive the space vacuum which is equivalent to a 10-billionth of atmospheric pressure.

In the new program, the microorganisms will be desiccated, or dried out, and placed on laboratory filter patches for space testing. The dried microbes will then be subjected to ultrahigh vacuum, fluctuating temperatures and varying time factors from one day to periods of a week or more. Ultraviolet radiation at wave lengths down to 2000 angstroms or lower will be introduced in the test facilities to simulate radiation found in space.

Further studies are expected to include particle bombardment, ionizing irradiation and the effect of mutation rates on survival of the bacteria.

Baseline control tests will be run simultaneously in varying atmospheric conditions.

- END -

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
Washington 25, D. C.

RELEASE NO. 61-133

For Release: IMMEDIATE
June ~~15~~, 1961
14

# PLUM BROOK REACTOR GOES CRITICAL

SANDUSKY, OHIO, JUNE 14 -- The National Aeronautics and Space Administration's Plum Brook Reactor began operating today on a low power calibration basis. The reactor a test facility of NASA's Lewis Research Center, Cleveland, is designed especially for the study of nuclear power system components. It was completed last March.

E. J. Manganiello acting director of Lewis said, "We are now using the reactor at low power to calibrate all instruments and equipment. This means that at start-up today the reactor registered a few watts. Over a period of several months this will be increased gradually to a maximum of 100 kilowatts. Then the reactor will be shut-down for ~~infal~~ final inspection."

The NASA executive explained that during shut-down the reactor would be subjected to a final inspection by the Atomic Energy Commission. The shut-down period will total about 30 days and then the reactor will be turned on with a long-term objective of reaching the full design power of 60 million watts.

"The task of research in nuclear propulsion technology is most formidable and requires careful long-range planning" Mr. Manganiello said. "For example, planning for the Plum Brook Reactor began more than five years ago" he added.

The reactor is an invaluable tool for the study of components such as pumps, turbines, shielding and propellant feed systems, and materials under radiation conditions similar to those anticipated in full-scale nuclear-powered systems for spacecraft. In operation the Plum Brook Reactor will simulate on the ground, under carefully controlled conditions, the radiation environment of nuclear power plants such as SNAP and Rover.

One of the experiments scheduled for early investigation in the reactor following achievement of full power is the effect of radiation on materials at the extremely low temperatures of propellants such as liquid hydrogen which will be used in atomic powered systems. Another experiment will determine the effects of radiation on material corrosion rates at high temperatures. Still other studies will be made to measure effects of radiation on sensitive electronic components.

The Atomic Energy Commission contributed materially to the establishment of the Plum Brook Reactor. Lewis engineers designed the facility in close consultation with the AEC. The AEC and NASA will continue cooperation in the Plum Brook programs.

Construction of the complex facility began in September of 1956 and total cost upon completion was about $13,000,000 million. The reactor has a staff of more than 150 including contractors. These are engineers, physicists, technicians and others.

- END -

Release No. 61-134

STATEMENT BY
JAMES E. WEBB, ADMINISTRATOR
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
ON H.R. 7377
BEFORE THE
SUBCOMMITTEE ON MANPOWER UTILIZATION
COMMITTEE ON POST OFFICE AND CIVIL SERVICE
U. S. HOUSE OF REPRESENTATIVES
June 20, 1961

MR. CHAIRMAN AND MEMBERS OF THE COMMITTEE:

I appreciate the opportunity to appear today in support of H.R. 7377, particularly as it relates to providing better management in Government through increases in the number of positions in the top grades authorized by the Classification Act of 1949, and through increases in the excepted positions which involve heavy responsibility for research and development in urgent Government programs.

The National Aeronautics and Space Administration is now faced with the problems of increasing its present level of effort by more than 50 percent in 1962 and increasing that level by almost 100 percent in Fiscal Year 1963. Approximately 80 percent of the work which we must do in order to achieve the earliest possible exploration of the moon, and continue our other space activities, will be done under contracts with private industries and non-governmental scientific institutions. Practically all of this work will be at the very forefront of modern science and technology.

What this country will be attempting to do will in most cases be out in front of anything heretofore undertaken.

Further, the Space Act imposes on us an additional responsibility to see that the lessons we learn and the benefits which can be derived from our very advanced technology are made available to industry in such a way as to expedite their application in whatever areas they can benefit our economy. These benefits can be enormous. All of this means that in the planning, in the organization, in the execution, in the follow-up and evaluation, and in the application of new things learned from experience as we progress, we simply cannot afford to have in our top positions of leadership anything but the best which the country has to offer.

Since World War II, it has been my privilege to serve in the Bureau of the Budget, the State Department, and now the National Aeronautics and Space Administration. Therefore, I have had an opportunity to see, over an extended time, the results of a pay structure for top executive and technical positions which was inadequate to retain in the Federal service many of its most effective and promising executives. Since World War II, there has been an increasing differential between governmental salaries for such positions and outside opportunities available to our country's ablest executives and technical leaders. The result has not only been a steady drain away from the very large and important programs of the Federal Government--on which, in many cases, our future as a nation depends--but a steady impairment of those incentives which attract into Government service able younger men who can replenish the talent bank that is so steadily being drawn upon.

In the years following World War II, many very capable men who had served during war time felt they had done their duty and left for better opportunities outside Government. To meet this problem the Classification Act of 1949 was enacted to permit three additional grades above GS-15 for at least a limited number of top career positions in the executive branch. This same act also enlarged the authorization to employ scientists and engineers at special higher rates of pay, although again in limited numbers. I believe this new approach to career salaries in the top echelons of Government made a big difference at the time in slowing up the loss of key civil service personnel to industry.

The 1949 Act did not, of course, eliminate the problem entirely because the new salary scales were still appreciably below the outside compensation, and the number of such positions authorized was quite limited. Nevertheless, this was a legislative landmark in Federal personnel administration. The subsequent increases in the number allowed and the subsequent adjustments in the pay scales have made it possible to retain in the public service many outstanding men and women.

The present requirements reflected in H.R. 7377 are the result of careful and independent study by the several agencies, the Civil Service Commission, and the Bureau of the Budget. Therefore, this request reflects a conservative assessment of what is required in the immediate future to assure continued successful leadership in the execution of the important programs on which our position as a nation depends.

Regardless of how we got there and whether we like it or not, our country is in an all-out competition to prove the merits of our social, economic, and political system. Unless our national programs in such areas as defense, atomic energy, medical research, space exploration, and many others succeed, we cannot maintain our position of leadership in the world. If the other nations of the world, whether friend or foe, find that we are ineffective in carrying out the things we undertake to do, the problems we face today will be increased manyfold. On the other hand, if we can attract into the leadership of our main governmental programs the best we have in America, we can prove an effectiveness that will attract the support and help of other nations and make the next steps easier and more manageable.

The necessity for men and women of high ability and capacity in positions of leadership in Government has become increasingly evident. New Government functions, and many of the older functions as well, now depend upon thorough understanding of science and technology. Their execution requires an effective relationship between Government and large segments of American industry. Under the circumstances, it is crucial that the Federal service be assured a means of attracting and retaining professional and executive talent with competence to deal with the public interest under even more complex conditions. The quality of technical and managerial talent which American industry finds it needs, and for which it is willing to pay well, is high. Yet the responsibilities which industry places upon such officials are far less than those we place on the individuals in high career positions in the public service.

The Federal Government today is the largest employer of professional and executive manpower in this country. Its key note in utilizing technological progress to implement domestic and international goals is of growing significance. In the last fifteen years there have emerged major research and development efforts in each of the fields I mentioned earlier: ballistic missiles, atomic energy, medical research, space exploration, and others. The largest part of the total effort takes place in industry, in universities, and other non-profit, non-governmental institutions. But large-scale programs of this character undertaken by Government cannot be conceived and organized, nor can they be efficiently managed and properly evaluated, unless the Government agencies themselves have career employees who are, professionally and managerially, fully as experienced and knowledgeable as the distinguished leaders in industrial and academic life with whom they must deal. Industry compensation, generally speaking, ranges from 25 percent to 100 percent more than the Government salaries for equivalent responsibility.

Personally, I do not feel as keenly as others may, that this is a sacrifice for individuals who have earned a high salary in industry and then answer a call to Government service. On the other hand, I do feel that an adequate career service cannot be built within Government if promotional ladders are cut off at GS-15 while official responsibilities continue to increase far beyond the authorized compensation. The public service clearly requires a level of executive and professional competence equal to or above that required by industry.

There are satisfactions and challenges in Government work which can be found nowhere else in our society. These will attract and hold many of the best men, even though the salaries paid may not be competitive with those offered outside. But the nation loses whenever the disparity in compensation reaches a point where the career servant feels that his increasing responsibilities are being ignored, and that his salary is based on an inadequate or unfair limitation on authorized positions rather than on an equitable criteria which relates his job to others in the Federal establishment and to outside opportunities, at least to some degree.

I should like to assert my strong belief that it is in the public interest to recognize the importance of paying adequate compensation for the key career leadership in the executive branch. At the same time, it must be recognized there are practical difficulties in creating a salary structure in Government which would be fully competitive with private industry. The steps proposed in H.R. 7377, which liberalize the number of executives who can be considered for the top three grades, will be a great forward step.

Turning now to the problems of the National Aeronautics and Space Administration, it is of great importance to protect our present highly qualified staff from the competitive inroads of industry. Under the program for space exploration proposed by President Kennedy, we must undertake a rapidly increasing load of development in rockets and space craft capable of carrying teams of men into space and to the moon. Our predecessor agency, the National Advisory Committee for Aeronautics, lost irreplaceable engineers in the late 40's and early 50's when the aeronautical industry rushed to convert aircraft for the jet age. At that time, the salary differentials between the NACA and the aircraft industry were simply too great. Government cannot afford to let this be repeated on any wide scale again.

H.R. 7377 contains a special section amending Sec. 203(b)2 of the National Aeronautics and Space Act. It proposes an increase of 50 positions in the number of key professional or administrative posts which the Administrator may compensate at rates up to $19,000. This would change the present National Space Act provision of 290 such excepted positions to 340.

At the time the Administration first determined its requirements for positions under this bill, President Kennedy had completed only a preliminary review of the national space program. He had determined to increase the FY 1962 budget request by $126 mission beyond the $1,109.6 million recommended by the previous Administration. The request for 50 more NASA positions was in line with that decision.

Since that time, as we all know, the successful manned space flights of both Gagarin and Shepard have demonstrated the opportunities for rapid progress in manned space exploration. These exploits have also demonstrated the extent to which progress in space is keenly watched by the entire world as an evidence of over-all technical and scientific strength. Accordingly, on May 25, President Kennedy recommended a further increase of $536 million for FY 1962, and on June 6 approved the need for 135 additional excepted NASA positions, rather than the 50 originally approved. Subsequently, the Bureau of the Budget approved, after consultations between the NASA and the Civil Service Commission, the addition of language to the FY 1962 NASA authorization bill. This would provide a total of 425 excepted positions, rather than the 340 as shown in the bill now before this Committee. The decision was made to add the language to H.R. 6874, rather than H.R. 7377, in order that the Congress might appraise this request at the same time it considers the accelerated program of funding as recommended by President Kennedy.

Within the present authorization of 290 excepted positions, 13 may be compensated up to $21,000, and the rest at rates up to $19,000. In the recent change to 425 positions, the request is to compensate an additional 17, making a total of 30 such positions authorized above $19,000 but not more than $21,000. In my judgment, the increase of 135 new jobs, including 17 which could be paid up to $21,000, is essential to meet the critical staffing needs NASA must fill during the next eighteen months.

Research and development teams are never easy to organize; this type of work takes care and time and calls for the highest of mature technical and managerial skills. Doing this under an accelerated schedule means that we must attract very able additional men into the program. Many of these we hope to obtain from outside the Government; at the same time, we must hold those who are trained inside the NASA and who now, after a long threshold at the GS-15 level, will seek more highly paid outside positions unless we can put them on even more responsible work at better pay.

The revised NASA authorization bill, H.R. 6874, has been under consideration for the past two weeks by the Senate Committee on Aeronautical and Space Sciences. The House of Representatives passed the original NASA authorization bill on May 24.

The Bureau of the Budget and the Civil Service Commission have given their full support to revising the present NASA authorizing legislation to include the additional 135 excepted positions. At the request of the Senate Aeronautical and Space Sciences Committee, a letter evidencing this support was submitted yesterday afternoon by Chairman John Macy to the Chairman of that committee, to your Chairman, and to the Chairman of the Senate Post Office and Civil Service Committee.

It is a matter of considerable urgency that NASA begin recruiting and selection for these additional positions, particularly in the projects affecting the manned lunar landing and nuclear rocket engine developments. No leeway for this is available within the current 290 positions. At the present time (June 15) there are 272 excepted positions filled, and 13 obligated for approved positions, or a total of 285 out of the 290 authorized.

The accelerated national space program recommended by the President calls for the greatest single technological effort our country has thus far undertaken. We can do this job, do it well, and gain immeasurably in the process. But we cannot afford to invest the billions of dollars this program will involve over the next decade without assuring ourselves an adequate number of the very best technical and managerial talent this country can produce.

Thank you, Mr. Chairman.

# NEWS RELEASE

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
1520 H STREET, NORTHWEST · WASHINGTON 25, D. C.
TELEPHONES: DUDLEY 2-6325 · EXECUTIVE 3-3260

FOR RELEASE: June 19, 1961

RELEASE NO. 61-135

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## INTERNATIONAL SATELLITE AND SPACE PROBE SUMMARY

The following space vehicles are in orbit as of this date:

| NAME/COUNTRY | LAUNCH DATE | TRANSMITTING |
|---|---|---|
| Explorer I (US) | Jan. 31, 1958 | No |
| Vanguard I (US) | Mar. 17, 1958 | Yes |
| *Lunik I (USSR) | Jan. 2, 1959 | No |
| Vanguard II (US) | Feb. 17, 1959 | No |
| *Pioneer IV (US) | Mar. 3, 1959 | No |
| Explorer VI (US) | Aug. 7, 1959 | No |
| Vanguard III (US) | Sep. 18, 1959 | No |
| Explorer VII (US) | Oct. 13, 1959 | Yes |
| *Pioneer V (US) | Mar 11, 1960 | No |
| Tiros I (US) | Apr. 1, 1960 | Yes |
| Transit I-B (US) | Apr. 13, 1960 | No |
| Spacecraft I (USSR) | May 15, 1960 | No |
| Midas II (US) | May 24, 1960 | Yes |
| Transit II-A (US) | June 22, 1960 | Yes |
| NRL Satellite (US) | June 22, 1960 | No |
| Echo I (US) | Aug. 12, 1960 | No |
| Courier I-B (US) | Oct. 4, 1960 | Yes |
| Explorer VIII (US) | Nov. 3, 1960 | No |
| Tiros II (US) | Nov. 23, 1960 | Yes |
| Samos II (US) | Jan. 31, 1961 | No |
| *Venus probe (USSR) | Feb. 12, 1961 | No |
| Explorer IX (US) | Feb. 16, 1961 | No |
| Discoverer XX (US) | Feb. 17, 1961 | No |
| Discoverer XXI (US) | Feb. 18, 1961 | No |
| Explorer X (US) | Mar. 25, 1961 | No |
| Discoverer XXIII (US) | Apr. 8, 1961 | No |
| Explorer XI (US) | Apr. 27, 1961 | Yes |
| Discoverer XXV (US) | Jun. 16, 1961 | Yes |

*In solar orbit; others in Earth orbit.

**CURRENT SUMMARY** (June 19, 1961)

| | | |
|---|---|---|
| Earth Orbit: | US | 23 |
| | USSR | 1 |
| Solar Orbit: | US | 2 |
| | USSR | 2 |
| Transmitting: | US | 9 |
| | USSR | 0 |

**COMPLETE SUMMARY** (Launched to date)

| | | |
|---|---|---|
| Earth Orbit: | US | 40 |
| | USSR | *12 |
| Solar Orbit: | US | 2 |
| | USSR | 2 |
| Lunar Impact: | USSR | 1 |

*Lunik III passed once around Moon, then into Earth orbit.

**Project:** DISCOVERER XXIV

**Project Direction:** U.S. Air Force

**Launched:** June 8, 1961
5:16 p.m., EDT

**From:** Vandenberg AFB, Calif.

**Lifetime:** Not Applicable

**Major Objectives:** Systems evaluation of Agena B, emphasizing testing of components recently changed; improvements of orbital period control; ejection and recovery of capsule.

**Major Results:** Orbit not achieved, apparently due to ignition failure of second stage.

## Flight Program

**Launch Vehicle:** Thor Agena. Stages: (1) Modified Thor booster; (2) Agena B

**Lift-Off Weight:** 115,000 lbs. (Approx.)

**Dimensions:** 81 ft. high; 8 ft. base diameter

**Program:** Place satellite in near polar earth orbit and recover capsule.

**Program Results:** Orbit not achieved.

**Perigee (Miles):** Not Applicable
**Apogee (Miles):** Not Applicable

**Inclination:** Not Applicable
**Period:** Not Applicable

**Velocity:** Not Applicable

## Payload And Instrumentation

**Dimensions:** Second stage and capsule: 25 ft. high, 5 ft. diameter

**Payload Weights:** 2,100 lbs. (Approx.) including second stage casing and 300 lb. reentry capsule, retrorocket, and recovery aids.

**Payload Configuration:** Cylindrical

**Instrumentation:** Included reentry capsule to be ejected from satellite, retrorocket and recovery aids.

**Transmitters:** Not Available

**Power Supply:** Not Available

**Additional Data:**

**Sources:** U.S.A.F.
Department of Defense

**Date:** Prepared June 17, 1961

**Project:** Discoverer XXV (1961 Xi)

**Project Direction:** U.S. Air Force

**Launched:** June 16, 1961
7:03 p.m., EDT

**From:** Vandenberg AFB, California

**Lifetime:** 25 days (estimated)

**Major Objectives** Systems evaluation of Agena B, emphasizing testing of recently changed components; improvement of orbital period control; ejection and recovery of capsule.

**Major Results:** Orbit achieved. Capsule ejected 6 pm PDT, June 18 from Agena and recovered from sea same day north of Hawaii.

S-10-14

*Flight Program*

**Launch Vehicle:** Thor Agena. Stages: (1) Modified Thor Booster; (2) Agena B

**Lift-Off Weight:** 115,500 (Approx.)

**Dimensions:** 81 ft. high; 8 ft. base diameter

**Program:** Place satellite in near-polar Earth orbit and recover capsule.

**Program Results:** Orbit achieved.

Orbital Elements for Agena:

**Perigee (Miles):** 139.1

**Apogee (Miles):** 251.6

**Inclination:** 82.11° to equator

**Period:** 90.87 minutes

**Velocity:** 18,000 m.p.h.

*Payload And Instrumentation*

**Dimensions:** Second stage and capsule: 25 ft. high, 5 ft. diameter.

**Payload Weights:** 2,100 lbs. (Approx.) including second stage casing and 300 lb. reentry capsule, retrorockets and recovery aids.

**Payload Configuration:** Cylindrical

**Instrumentation:** Capsule carried rare and common metals to permit study of the effects of space environment on them; also instruments to measure radiation and micrometeorite effects.

**Transmitters:** Not Available

**Power Supply:** Not Available

DISCOVERER XXV

**Additional Data**

**Sources:** USAF, Department of Defense

**Date:** June 19, 1961

**Project:** Transit IV-A (1961 Omicron)

**Project Direction:** U.S. Navy

**Launched:** June 29, 1961
12:23 a.m., EDT

**From:** Atlantic Missile Range

**Lifetime:** 1 - one year;
2 & 3 - indefinite

**Major Objectives:** Orbit 3 satellites to: 1. Develop all-weather global navigation system (Transit IV-A), 2. Measure solar x-ray radiation (Grab III), and 3. Measure cosmic radiation intensity (Injun). See payloads 1, 2, and 3 below.

**Major Results:** Orbit achieved. Payloads 2 and 3 apparently failed to separate.

*Flight Program*

**Launch Vehicle:** Thor-Able-Star. Stages: (1) Modified USAF Thor IRBM; (2) USAF Able-Star liquid engine with re-start capability.

**Lift-Off Weight:** 120,000 lbs.

**Dimensions:** over 79 ft. high; 8 ft. base diameter

**Program:** Place satellites in near-circular earth orbit.

**Program Results:** Orbits achieved.

**Perigee (Miles):** 1. 534 2.&3. 534
**Apogee (Miles):** 1. 623 2.&3. 634

**Inclination:** 1. 67° to equator, 2.&3. 67°
**Period:** 1. 103.7 min., 2.&3. 103.8 min

**Velocity:** at Perigee: 1. 16,710 2. & 3. 16,639
at Apogee: 1. 16,346 2. & 3. 16,381

*Payload And Instrumentation*

**Dimensions:** 1. 43 in. diameter, 31 in. high; 2. 20 in. diameter, 3. 16 in. diameter, 13 in. long

**Payload Weights:** 1. 175 lbs.; 2. 55 lbs.; 3. 40 lbs.

**Payload Configuration:** 1. Polygon with flat top and bottom and 16 sides. 2. Sphere. 3. Cylindrical.

**Instrumentation:** 1. Memory system and electronic clock; 2. Two x-ray detectors; 3. Twelve particle and proton detectors of various types.

**Transmitters:** 1. Four transmitters, two powered by nuclear generator; 2. One transmitter. 3. One transmitter, 136.20 MC.

**Power Supply:** Solar cells, nickel cadmium batteries, and radioisotopic-fueled thermoelectric generator.

**Additional Data:** Transit IV-A first satellite to use nuclear generator. Fueled with plutonium 238, this non-explosive nuclear item weighs about 4½ lbs. and is oval shaped. It was built by the Martin Co. for the Atomic Energy Commission and measures about 5 in. x 5½ in.

**Sources:** U.S. Navy

**Date:**

Chron

# NEWS RELEASE

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
1520 H STREET, NORTHWEST · WASHINGTON 25, D. C.
TELEPHONES: DUDLEY 2-6325 · EXECUTIVE 3-3260

FOR RELEASE: UPON DELIVERY

No. 61-136

STATEMENT BY

JAMES E. WEBB, ADMINISTRATOR

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

UPON ACCEPTANCE OF

THE PRESIDENT'S SAFETY AWARD FOR 1960

IN THE DEPARTMENTAL AUDITORIUM

WASHINGTON, D.C.

JUNE 21, 1961

* * *

I am deeply gratified and honored to receive on behalf of the National Aeronautics and Space Administration one of the three President's Safety Awards for accident prevention during 1960.

As you know, NASA has a unique role as a research and development agency pioneering in the fields of aeronautics and space. We have had to develop new types of safety rules and regulations to govern performance of work that is often extremely hazardous in nature.

This includes test flying of experimental aircraft. For example, NASA's most advanced rocket-powered plane, the X-15, has flown at speeds ranging up to 3,200 miles per hour and at altitudes of more than 32 miles. NASA is developing and testing high-energy, highly explosive fuels which have never previously been used. High-voltage electricity is utilized in many NASA experiments, as is air pressurized to several thousands of pounds to the square inch and heated to temperatures of several thousand degrees Fahrenheit. The agency is developing, testing, and launching rockets and spacecraft, and is operating two nuclear reactors and a cyclotron.

The award presented to NASA today testifies to the effectiveness of our safety measures. It also is evidence of the fact that every one of NASA's approximately 17,000 employees is dedicated to the goal of making these measures working realities.

NASA's safety record is not confined to installations in the United States. We operate a network of tracking and data facilities on a worldwide basis. The safety performance of employees in other countries has also been outstanding.

It should be noted, too, that the NASA safety policy is designed not only to protect its own personnel and facilities, but also to eliminate hazards to all persons and property near installations or in the path of space and aeronautical experiments.

NASA strongly supports the Federal Safety Council and has taken an active hand in organizing field councils, such as the Hampton Roads and the Cleveland Federal Safety Councils.

As part of the United States program for manned space flight, on May 5 Astronaut Alan Shepard was rocketed 115 miles above the surface of the earth and returned unharmed. Figuratively, this flight was the apex of a pyramid of effort over 31 months, which involved the most painstaking tests of every component in the Mercury capsule, in the rockets for boosting the capsule into space, and in the supporting complex of ground facilities. As incredible as it may seem, no less than 1,200,000 tests have been made to qualify the Project Mercury system as spaceworthy.

A key feature of the Mercury capsule system is an escape tower, equipped with rockets to provide the astronaut the ultimate degree of safety. As repeated prior tests proved, if the booster for Shepard's flight had malfunctioned in any way, the rockets of the safety tower would have fired instantly and would, at tremendous speed, have carried him and the capsule out of harm's way.

Many of the 1,200,000 tests that made the first United States manned space flight such a success reflected NASA's safety program, which is carried out in every area of science and technology and is an integral part of all the agency's activities.

I can assure you that every employee of NASA will continue vigilantly and enthusiastically to participate in the safety policies for which we have today received the President's award.

# # #

Chron.

# NEWS RELEASE

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
1520 H STREET, NORTHWEST · WASHINGTON 25, D. C.
TELEPHONES: DUDLEY 2-6325 · EXECUTIVE 3-3260

RELEASE NO. 61-138

FOR RELEASE: Wednesday, 11 a.m.
June 20, 1961

## NASA RECEIVES PRESIDENTIAL SAFETY AWARD

Despite hazards involved in space research activites, the National Aeronautics and Space Administration last year maintained the lowest accident frequency rate of all federal agencies engaged in industrial operations.

In recognition of its accident prevention program and safety record, NASA today received the President's Safety Award for 1960. The presentation was made to NASA Administrator James E. Webb during a public ceremony in the Departmental Auditorium under the auspices of the Federal Safety Council.

In addition to the award, NASA's safety program has also contributed to the reduction of employes' insurance premiums by more than one-third.

The President's Safety Award received today, is one of three given annually to departments or independent agencies of the federal government for the best safety records during the year. NASA, in the 10,000-to-75,000 employe class, was one of seven nominated.

Other winners were the Atomic Energy Commission in the under-10,000 employe class, and the Veterans Administration in the over-75,000 employe class.

To be eligible for the award, an agency must show a decline in the accident frequency rate and the severity of disabling injuries. The agency is then rated on its over-all accident prevention program. NASA was rated at 95 percent of perfect.

George D. McCauley, NASA safety officer, said NASA's hazardous activities include use of radio-active materials, high voltage electricity, exceedingly high air and gas pressures at temperatures of several thousand degrees Fahrenheit, test flying of experimental aircraft at supersonic speeds at altitudes in excess of 100,000 feet, manned space flight, developing and testing high-energy fuels that are highly toxic, rockets, and spacecraft, and operation of two nuclear reactors and a cyclotron.

The NASA organization consists of a headquarters, six large research centers, two field stations and three field offices, with a total staff of nearly 17,000 employes. Its operations are world-wide.

Also this week, the Home Life Insurance of New York presented a dividend check in the amount of $133,969.46 to Mr. Webb at the annual meeting of the Board of Governors of the NASA Employe Benefit Association. This is the second consecutive year in which NASA dividend checks have exceeded $130,000.

The $133,969.46 check, which represents 29 percent of the insurance premiums paid during the year, is the highest return in the nine years the insurance has been in effect.

-END-

61-157

FOR RELEASE UPON PRESENTATION
Expected 10:30 a.m.

Statement

of

Mr. James E. Webb
Administrator
National Aeronautics and Space Administration

before the

Subcommittee on Independent Offices
and General Government Matters
Committee on Appropriations
United States Senate

June 21, 1961

Mr. Chairman, Members of the Committee,

The bill before you is H.R. 7445, passed by the House of Representatives on June 7, which provides $1,200,000,000 in new obligational authority for the National Aeronautics and Space Administration. Some aspects of the budgetary and legislative history are pertinent to our discussion of the bill.

The original FY 1962 budget submission in January of this year for NASA was for $1,109,630,000. On March 24, the President submitted a request for an increase of $125 million in the civilian space program, making a total of $1,235,300,000. This submission was (1) to fund more adequately the F-1 1-1/2 million-pound-thrust engine which continues to show real promise as a basic building block for large boosters, and (2) to provide funds to step up the C-2 version of the Saturn booster to increase the Saturn capability from about 20 thousand pounds in a low earth orbit to over 40 thousand pounds. There were other items included, but they were all based on the President's decision that we should proceed at once to plan and carry out manned space flight projects beyond the Mercury program and to proceed as rapidly as possible toward the practical utilization of the scientific and technological information and capability gained through our space effort. To utilize the technology which was emerging from our investment in space, work toward applications of tremendous value was included in such areas as communications satellites and weather satellites.

On June 7, the House of Representatives passed the bill with a decrease of $35,300,000 from the President's initial requests.

On May 25, President Kennedy reported to the Congress that, regarding the space program, "with the advice of the Vice President, who is Chairman of the National Space Council, we have examined where we are strong and where we are not, where we may succeed and where we may not." The President then made additional policy recommendations, in these words: "Now it is time to take longer strides -- time for a great new American enterprise -- time for this nation to take a clearly leading role in space achievement, which in many ways may hold the key to our future on earth."

Having stated these views with respect to space, the President then said: "Let it be clear -- and this is a judgment which the members of Congress must finally make -- let it be clear that I am asking the Congress and the country to accept a firm commitment to a new course of action -- a course which will last for many years and carry very heavy costs . . . ."

The following day, May 26, the President submitted additional estimates of new obligational authority needed by the National Aeronautics and Space Administration for the fiscal year 1962, amounting to $549 million.

I should like to make some brief observations on the importance of the science and technology we will evolve as we push on with our program for landing a three-man American team on the moon. The influence of the technical progress required to do this will be felt throughout our economy and will add zest and stimulation to education in all its branches. Many of the instruments, equipment, power sources, and techniques which we must devise as we accelerate our push into space will be adaptable to a host of other uses.

The result will be a great variety of new consumer goods and industrial processes that will raise our standard of living and return tremendous benefits to us in practically every profession and activity.

This science and technology will almost certainly differ from what might have come into being without the drive and integrating force of a major space effort. Moreover, the goal of mastering space is essential insurance against finding ourselves, in two decades or less, with a technology inferior to that of the Soviet Union which will undoubtedly continue driving forward along the space frontier. It is also insurance against military use being made of the new technology to jeopardize our security.

I should like to indicate the main areas of increase proposed in the President's May 25th message to the Congress.

The total of $549 million includes the following:

For the Apollo spacecraft, the three-man vehicle capable of safe return from the Moon at 36 thousand feet per second, and for supporting research facilities and work in the life sciences, $202,500,000;

For the F-1 engine, the 1,500,000-pound-thrust liquid-propellant engine,

used in clusters for the very large vehicle required for the manned lunar mission (called Nova) with necessary test and other facilities, and activities related to an aggressive beginning on the Nova vehicle, $121.5 million;

For unmanned lunar exploration in preparation for manned missions, $56 million;

For general supporting research, tracking-station facilities, sounding-rocket programs, and advanced-facility design required in the manned lunar program, $74 million;

To speed up both the research and a start toward a transitional system of communications satellites, $50 million;

For engine development for the nuclear rocket Rover, $23 million;

For the purchase and launch of additional Tiros weather satellites so that one can be kept continuously in orbit until the Weather Bureau is able to place in operation its world-wide system based on the Nimbus satellite, $22 million.

The above increases, added to those previously recommended by President Eisenhower and President Kennedy, constitute a total budget request for the National Aeronautics and Space Administration for the fiscal year 1962 of $1,784,300,000. My associates and I are prepared to present the details of this total program.

The sums requested are necessary to an adequate national space program and to a rapid build-up toward the accomplishment of the objectives which have been stated by the President. These requests, taken together with those of the other agencies, constitute a hard-hitting, well-rounded, national space effort.

In the execution of this very important program, the President has directed each of us holding a major management responsibility to work closely with the officials in other agencies concerned, to make every effort to use the most efficient resources available to the Government wherever they may be, and to keep the Vice President and staff of the Space Council thoroughly abreast of our efforts. I would like to say that I have never found better teamwork among the agencies than has been achieved in the development of this program.

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61-137

NEWS RELEASE

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
1520 H STREET, NORTHWEST · WASHINGTON 25, D. C.
TELEPHONES: DUDLEY 2-6325 · EXECUTIVE 3-3260

FOR RELEASE: Monday AM's
June 26, 1961

RELEASE NO. 61-139

SCOUT DEVELOPMENT FLIGHT TO LAUNCH MICROMETEOROID SATELLITE(S-55)

NASA will soon attempt to launch from Wallops Station, Va., a micrometeoroid satellite on the fifth of a series of developmental flights of the Scout rocket.

Primary purpose of this flight is to give scientists another opportunity to study the performance, structural integrity and environmental conditions of the 72-foot, 36,600-pound, four-stage Scout launch vehicle and its guidance control system.

The satellite experiment is designed to send back information about micrometeoroids in space between 240 and 620 miles above the earth, their characteristics, and their potential hazard to future space flights. Micrometeoroids are small particles in outer space; within the earth's atmosphere they are called micrometeorites.

Both launch vehicle and satellite were entirely developed by NASA.

Scout has been under development under direction of the NASA Langley Research Center since mid-1958 to provide the United States with a small, reliable and flexible solid-fuel booster capable of space probes and orbital missions.

Thus far, the Scout development program has included two ballistic flights and two orbital efforts. In the last flight--February 16, 1961--Scout injected into orbit the 12-foot-diameter inflatable spherical satellite Explorer IX now being used in air density-drag measurement investigations. This flight marked the first time a satellite has been placed in orbit by a booster fueled entirely with solid propellants; and it was the first satellite launched into orbit from Wallops Island. This NASA facility was established by NACA in 1945 as a sounding rocket launching station.

NASA scientists--recognizing that one of the hazards of the space environment is the possibility of damage to space vehicles by collision with micrometeoroids--devised the NASA micrometeoroid satellite to allow a more accurate estimate of the probability of penetration by sparsely distributed particles and material debris in certain areas of space. The direct measurements to be obtained as a result of this flight are expected to be useful in planning the design and operation of future spacecraft.

The cylindrical micrometeoroid satellite (S-55) is about 24 inches in diameter and approximately 76 inches long and is installed around the 18-inch-diameter, 72-inch-long Altair rocket motor--fourth stage of the Scout launch vehicle. A thin heat shield which protects the satellite during ascent will be jettisoned in space, exposing five types of highly-sensitive detectors to impact by high-velocity space particles as the payload orbits the earth.

The experiment will give a direct measure of the puncture hazard of micrometeoroids in spacecraft structural skin samples and will measure micrometeoroid flux rates. In addition, the satellite will provide data regarding the erosion of spacecraft materials due to small particles in space, and will record information for the design of solar cells for spacecraft power through a comparison of measurements obtained from protected and unprotected solar cells.

Scientists plan to launch the satellite in an easterly direction, injecting it into orbit some 1,060 statute miles down range about eight minutes after lift-off from Wallops Island. The elliptical near earth orbit is expected to reach an initial apogee of 620 statute miles on its first pass over Australia and an initial perigee of 240 statute miles over the Atlantic Ocean as it begins its second trip around the earth. Initial orbital period is estimated at 99 minutes. The satellite is programmed to travel at a velocity of about 17,545 mph as it is injected into orbit and at perigee. Satellite speed at apogee will be approximately 16,085 mph.

The belt covered by the initial orbits will extend 38 degrees north and south of the equator. On its first orbit, the satellite will cross the southern portion of Africa, mid-Australia, and the southern section of the Hawaiian Islands--then pass over the central area of continental United States beginning north of San Diego, California, before it reaches the Atlantic Ocean just south of the launch site.

The satellite's experiments are attached to the fourth stage, which goes into orbit as part of the satellite after burning out. Total satellite payload weight, including the various sensors, other scientific equipment, and mounting hardware, will be 125 pounds. The spent fourth-stage rocket will weigh about 50 pounds and the upper transition section which connects the fourth stage to the third stage will weigh at 12 pounds, for a total orbiting satellite weight of 187 pounds.

A stainless-steel nose-cap and Fibreglas -bodied heat shield which protects the payload from aerodynamic heating during acent will be jettisoned just prior to third-stage ignition at about 344,000 feet--a point where scientists believe no appreciable aerodynamic heating can occur to damage the delicate exposed micrometeoroid experimental devices.

Preflight ground tests to determine temperatures of the satellite during ascent and to establish that no damage would be experienced by the payload at ejection of the heat shield were conducted for NASA by Vought Astronautics Division of Chance Vought Aircraft, Dallas, Texas. The test program consisted of externally heating the shield and measuring temperatures at various stations; and climaxing the test with ejection of the protective cover. No damage to the satellite prototype due to heating or separation of the heat shield was apparent and the heat shield itself was free of damage due to heating.

After launch, Scout's first stage remains connected to the vehicle until it is blasted off at second stage ignition at 130,000 feet. After second stage burnout at about 257,000 feet but before separation, the remaining attached stages coast to 344,000 feet, where the fourth stage heat shield is released--permitting the folded antennas to become erect and exposing the micrometeoroid detectors in the satellite to the space environment. This is followed immediately by third stage ignition and separation of the second stage. The third stage burns out at about 516,000 feet, but it remains attached to the fourth stage to provide guidance and control during coast to the apogee of the ascent trajectory--243 statute miles. Then the fourth stage, spun to about 190 rpm by small spin rockets, is ignited and released from the third stage. The velocity increment gained during fourth stage burning is sufficient to place the payload as well as the fourth stage, which remains attached to the payload, into orbit. Time from liftoff to injection into orbit is planned to be 8 minutes and 18 seconds.

## SCOUT RESEARCH VEHICLE

The Scout concept originated at the Langley Research Center--in the Applied Materials and Physics Division, which has conducted a variety of aero-space research programs at Wallops Island, using solid fueled research vehicles having from one to seven rocket stages. A special Scout Project Group, including several veterans of Wallops Island research launchings, was formed at Langley to develop the vehicle.

Scout, which has been under development under Langley's direction since mid-1958, is still in the development phase. As an operational vehicle, it is designed to place a 150-pound satellite into a circular orbit approximately 300 miles above the earth or to loft a 50-pound scientific probe to an altitude of about 8,400 miles. In reentry body tests, Scout will permit simulation of conditions expected by a space vehicle returning to the earth's atmosphere. With a ballistic trajectory, it will be possible to obtain almost two hours of zero-gravity environment with 100-pound experiments.

Major contractors and vendors in the program since mid-1958 have been:

Vought Astronautics Division of Chance Vought Aircraft, Dallas, Texas-launch tower fabrication and installation, airframe and motor transition section manufacturer.

Allegany Ballistics Laboratory, a Navy Bureau of Weapons facility operated by Hercules Powder Company at Cumberland, Maryland-third and fourth stage motor developments.

Aerojet-General Division of General Tire and Rubber Company, Sacramento, California-first stage motor development.

Redstone Division of Thiokol Chemical Corporation, Huntsville, Alabama-second stage motor development.

Aeronautical Division of Minneapolis Regulator Company, Minneapolis, Minnesota-guidance.

Walter Kidde, Clifton, New Jersey-Hydrogen-peroxide controls.

Chance Vought Aircraft Company is now vehicle prime contractor for the Scout launch vehicle system, including responsibilities for final assembly and preparation of the vehicle for launch. Under the new arrangement, announced by NASA October 20, 1960, at the time a $6 million contract was awarded to Chance Vought as vehicle prime contractor, Langley retains technical direction of the four-stage Scout vehicle.

The following is a description of the four Scout rocket stages and the vehicle's auxiliary parts:

First Stage: Algol, 30 feet long, 40 inches in diameter, and developing 103,000 pounds of thrust, is fin-stabilized and controlled in flight by jet vanes. The largest solid rocket flown in the United States, its sole operational application to date is as the Scout first stage. Algol is named for a fixed star in the constellation Perseus.

Second Stage: Castor is 20 feet long, 30 inches in diameter and has a thrust of over 62,000 pounds. A modification of the Sergeant motor, it has been used successfully in a cluster in NASA's Little Joe program in support of Project Mercury. On the Scout, the Castor is stabilized and controlled by hydrogen-peroxide jets. Castor is the "tamer of the horses" in the constellation Gemini.

Third Stage: Antares is 10 feet long and 30 inches in diameter with a thrust in excess of 13,600 pounds. Stabilized and controlled by hydrogen-peroxide jets and utilizing lightweight plastic construction throughout its design, Antares is a scaled-up version of the fourth stage and is the only motor developed specifically for Scout. Antares is the brightest star in the constellation Scorpio.

Fourth Stage: Altair, six feet long, 18 inches in diameter, and having 2,800 pounds of thrust, is the smallest of the four Scout stages. The spin-stabilized Altair formerly was known as X-248. It is the third stage on the Able and Delta launch vehicles and was the first fully developed rocket to utilize lightweight plastic construction throughout. Altair is a star of the first magnitude in the constellation Aquilae, or Eagle.

Auxiliary Parts: The added Scout airframe parts consist of control surfaces surrounding the nozzle of the first stage, transition sections connecting the four rocket stages, a Fibreglas-phenolic protective heat shield which covers the third and fourth stages plus payload, the fourth-stage spin-up table, and the payload attachment structure.

## SEQUENCE OF EVENTS

| TIME (Seconds) | | EVENTS |
|---|---|---|
| 0.0 | | First stage ignites. |
| 41 | | First stage burns out. |
| 76 | 1 min., 16 secs. | Second stage ignites; third stage heat shield released; first stage separated. |
| 116 | 1 min., 56 secs. | Second stage burns out. |
| 139 | 2 min., 19 secs. | Fourth stage heat shield released; payload antennas erected. |
| 140 | 2 min., 20 secs. | Third stage ignites; second stage separated. |
| 180 | 3 min. | Third stage burns out. |
| 455 | 7 min., 35 secs. | Spin motor ignites. |
| 457 | 7 min., 37 secs. | Fourth stage ignites; third stage separated. |
| 498 | 8 min., 18 secs. | Fourth stage burns out; satellite injected into orbit. |

## THE MICROMETEOROID SATELLITE (S-55)

The world of science is indebted to United States satellites for most of its current knowledge of micrometeoroids. Explorer I, Vanguard III, Explorer VII, and Explorer VIII are among those which made significant measurements, including discoveries that there are showers of this cosmic dust. Meteors of various sizes intersect the earth's orbit, sporadically and in showers traveling at extremely high velocities.

Meteoroids are material in space, composed of iron, silicates and other substances. Some are derived from the asteroids (possibly the remains of an exploded planet) which revolve around the sun between Mars and Jupiter. Those which are in elliptical orbits periodically cross the earth's path, and impact on the earth or moon. Comets, composed of material at cryogenic temperatures, which revolve in the outermost regions of our solar system, may be pulled into eccentric orbit, melt, decay, and form comet tails as they enter regions nearer the sun.

Meteoroids usually burn (become meteors) as they enter the atmosphere. Those which reach the earth are called meteorites. It is believed by many scientists that several thousand tons of minute meteorites (called micrometeorites) may settle on the earth in a single day.

These small particles, more numerous than formerly thought, may impact a satellite at velocities ranging from 7 miles per second to 45 miles per second.

More data on micrometeoroids will lead scientists closer to knowledge of the universe's constituency and origin since stars, comets, and planets may have been formed by the conglomeration of interstellar material.

The S-55, consisting entirely of micrometeoroid experiments about its sizable structure, should record impacts of larger sizes of micrometeoroids than previous satellites. It is designed to yield as much data as possible during its useful lifetime.

This data is needed by scientists. It is also vitally needed by engineers who will design future space flight systems. They need to know more about micrometeoroids in order to ensure the safety of manned spacecraft destined for long missions, and to design such systems as the huge radiators which will be needed on electric and ion engines, powered by nuclear reactors.

The micrometeoroid satellite experiment is a cooperative effort of three NASA research centers, including the Langley Research Center, Langley Field, Virginia; the Lewis Research Center, Cleveland, Ohio, and the Goddard Space Flight Center, Greenbelt, Maryland. Langley has the responsibility for payload integration as well as the overall satellite system. Langley, Lewis, and Goddard designed the impact detecting transducers for determining micrometeoroid flux rates.

The five micrometeoroid detectors in the satellite will include pressurized cells, foil gages, and wire grids, providing a total of $24\frac{1}{4}$ square feet of area exposed to the penetration hazard, and cadmium-sulfide cells, and impact sensors, which will have a combined total of $4\frac{1}{4}$ square feet exposed for impact detection. Five test groups of window-like silicon solar cells on the nose of the satellite will determine what protection solar cells in future space experiments will require. Five cells are shingled for each group: two groups will be unprotected, two groups will have 6-mil glass slides covering the sensitive area, and one group will have a 62-mil quartz window protecting them. A series of temperature measurements at selected places throughout the satellite will give additional data. A telemeter system with erectable antennas will be located in the nose section to transmit data to ground receiving stations.

Each of the sensors installed in the satellite is capable of producing a measurable electrical signal that can be stored and subsequently telemetered from the orbiting payload to the Minitrack Receiving Station Network of the Goddard Space Flight Center. The following is a description of the five micrometeoroid detectors installed in the satellite:

Pressurized cells: These beryllium copper detectors, the primary sensors of the experiment, include 160 half-cylinders ranging in thickness from one-thousandth to five-thousandths of an inch. The 2-inch-wide flat area of each of the $7\text{-}\frac{1}{4}$-inch-long half cylinders is mounted in five rows of 32 cells each around the circular exterior of the Altair rocket motor, leaving the can-like cylindrical portion exposed to micrometeoroids. The pressurized cells occupy about a 38-inch-long section of peripheral space in the center of the satellite. The exposed cells will be pressurized with nitrogen and helium so that a puncture by a micrometeoroid will allow pressure to leak out. By means of a pressure-activated switch in the end of each cell, the pressure loss will be detected and telemetered at the proper time to ground receiving stations. The penetration area of the 160 cells to be exposed to micrometeoroids totals about 17-¼ square feet. The pressurized cell detector system was designed and fabricated by Langley to provide information on the ability of certain thicknesses of metal to resist penetration by micrometeoroids.

Foil gages: Sixty foil gage detectors, each in the shape of an equilateral triangle with a 4.57 inch base, are installed around the forward useable half of the fourth-stage launch vehicle support structure. They were conceived and developed by the Lewis Research Center and built by the Buckbee Mears Company. Each detector consists of a circuit obtained by an electrochemical deposition process, about 90 microinches thick attached to one-mil Mylar and mounted on the underside of 304-stainless steel skin samples--with 48 of the skin samples being 3-mil thick and 12 of 6-mil thickness. Micrometeoroids which penetrate the stainless steel skin samples and break the foil circuits will cause a change in the resistance level in the electronic circuit--thus recording basic information that can be later telemetered to earth. Through the use of two thicknesses of stainless steel, information will be obtained on the micrometeoroid penetration hazard. Total surface exposed to micrometeoroids in this experiment is about 3-3/4 square feet.

Wire grids: These detectors, developed by Goddard Space Flight Center, are similar to sensors flown on previous satellites. The 46 detectors consist of a winding of fine copper wire mounted to 1.45 by 7 inch rectangular melamine cards. Fourteen of the cards will be wound with 2-mil wire and 32 cards with 3-mil wire, providing a total exposed area of 3-¼ square feet to penetration by micrometeoroids. As space particles strike the grids and break the wound wire at any location, the resultant change in resistance recorded for subsequent telemeter transmission to the ground will give scientists information on the penetration hazard. The wire grids occupy the aft portion of the remaining useable half of the fourth-stage launch vehicle support structure.

Cadmium-sulfide cells: Two of these detectors, also developed by the Goddard Space Flight Center, will be mounted in the nose cone of the satellite about 180 degrees apart. Each detector consists of a cadmium-sulfide cell mounted in an aluminized glass flask. The six square inches of exposed surface provided by the two detectors are covered with a sheet of quarter-mil Mylar coated with evaporated aluminum on both sides. In flight, extremely small particles striking the ultra-sensitive detector will penetrate the Mylar film and allow light to focus on the cadmium-sulfide cell, changing its resistance, and permitting it to record information on the size of impacting micrometeoroids.

Impact detectors: Piezoelectric crystal impact detecting transducers, accoustically decoupled from the satellite structure, are mounted on sounding boards located on the nose cone. Some are mounted on the pressurized cell area around the center of the satellite. They provide a total of 3-3/4 square feet of area exposed to micrometeoroids. Three levels of impact detecting sensitivity will be employed: the sounding board portion of the satellite has the capability of recognizing micrometeorite impacts of two different velocity levels to help identify micrometeorite particle masses. Correlation of the cumulative number of impacts of each momentum level with the number of penetrations of the various materials in the pressure cell area may provide the possibility of identification of particles masses by statistical data analysis methods. Similarly, the pressure cell transducer portion of the satellite is sensitized to micrometeoroid impacts at a certain level. An additional expectation from this portion of the experiment is that the lower momentum sensitivity level employed may afford some correlation between this type of experiment, and the pressurized cell experiment.

The electronics which form part of the satellite payload will perform two functions: as a radio beacon during orbital tracking; and as experiment telemeters during the approximately one year lifetime of the scientific package. The radio beacon will be activated to transmit until its batteries are exhausted. Two separate telemeters--working independently to enhance reliability--will be used for storing and telemetering data to be collected by the orbiting satellite. Separate solar cells and batteries will supply power as well as separate electronics for handling data. The telemeters will be turned on at prescribed periods by a command from the ground and after one minute of data transmission will be turned off by an electronic internal timer until the next transmission command is given. Communication with the satellite will be on two frequencies: 136.860 megacycles and 136.200 megacycles.

This is a satellite weight breakdown: Nose cone, including sounding boards, power solar cell trays, test solar cell trays, heat transfer ring, antennas, cadmium-sulfide cells, mounting hardware, and wiring, 27.57 pounds; bulkhead assembly, including telemeter system, batteries, hardware, plugs, and wiring, 33.93 pounds; pressurized cells, including mounting hardware, plugs, and wiring, 46.93 pounds; grid detectors, including mounting hardware, 4.78 pounds; gage detectors, including mounting hardware, 6.50 pounds; payload support, 4.37 pounds; heat shield bumper ring, 1.42 pounds, for a total payload weight of 125.50 pounds. This figure, added to the 50-pound burned out rocket motor and 11.73-pound weight of the transition section gives a total satellite weight of 187.23 pounds.

## TRACKING AND DATA ACQUISITION

During launch and through the first three orbits, it is planned that the satellite will be tracked by the Goddard Space Flight Center's Minitrack stations at Blossom Point, Md., and Ft. Myers, Fla., and by radar at Millstone Hill, Mass., and Trinidad, WIF. First interrogation of the satellite on the initial orbit will be by Blossom Point. In addition, telemeters will be read out at Wallops Island to permit a quick look at the experiments. Tracking stations at Wallops Island, Bermuda, and Blossom Point will track the ascent of the vehicle. During the first two weeks, the satellite will be interrogated once per orbit by the Minitrack network in North and South America. Any changes in data acquisition plans will depend on data penetration rates and changes in the satellite orbit. Data will be recorded on magnetic tape and sent to Langley, where they will be reduced through use of automatic data processing equipment. Scientists at the respective NASA centers cooperating in the program will analyze the data for application to future space flight programs.

## PERSONNEL

There follows a listing of personnel, their affiliations, and responsibilities in connection with the Scout development flight and the micrometeoroid satellite experiment:

### Langley Research Center

Charles T. D'Aiutolo, payload manager and in charge of Langley's responsibilities for providing micrometeoroid detectors; William E. Stoney Jr., Head of the Scout Project Office; James R. Hall, NASA project engineer for the orbital flight; Hugh C. Halliday, payload coordinator; and Walt C. Long, payload telemetry.

### Goddard Space Flight Center

W. Merle Alexander and Luc Secretan, in charge of the Goddard detectors, and Anthony Buige, in charge of tracking and data acquisition.

### Lewis Research Center

Elmer Davison, in charge of the Lewis detectors.

### Wallops Station

Robert Duffy, Wallops Station test director for the orbital flight.

### NASA Headquarters

Maurice Dubin, NASA Headquarters consultant on the spacecraft; R. D. Ginter, NASA Headquarters manager of Scout vehicle development program; M. J. Aucremanne, NASAk Headquarters payload project officer; others representing NASA Headquarters are J. L. Mitchell, M. T. Charak, and W. E. Williams.

### Vought Astronautics Division, Chance Vought Aircraft

Billy H. Kilgore, Wallops Base supervisor of Chance Vought operations.

# NEWS RELEASE


NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
1520 H STREET, NORTHWEST · WASHINGTON 25, D. C.
TELEPHONES: DUDLEY 2-6325 · EXECUTIVE 3-3260


FOR RELEASE: Saturday AM's
June 24, 1961

RELEASE NO. 61-140

## NASA-ARGENTINE COOPERATIVE SPACE RESEARCH PROGRAM

As a result of recent discussions, officials of the National Aeronautics and Space Administration and the Argentine Comision Nacional de Investigaciones Espaciales (Argentine National Commission on Space Research) signed a Memorandum of Understanding for a cooperative space science research program using sounding rockets.

Dr. Hugh L. Dryden, Deputy Administrator of NASA and Professor Teofilo Tabanera, President of the National Commission on Space Research signed the document, dated June 14, 1961, for their respective organizations.

Other members of the Argentine Commission who accompanied Professor Tabanera to Washington were Commodore Aldo Zeoli, Deputy Director of the Instituto Aerotecnico de Cordoba; Licenciado Lucio Fernandez, Director of the National Meteorological Bureau and Dr. Carlos Varsavsky, Professor in the Faculty of Sciences of the Buenos Aires University. During the week of June 5- 11 the group visited the NASA Goddard Space Flight Center, Greenbelt, Maryland and the Wallops Island Space Flight Station, Wallops Island, Virginia in addition to meeting with officials at NASA Headquarters.

The text of the Memorandum of Understanding follows:

"The U.S. National Aeronautics and Space Administration and the Argentine Comision Nacional de Investigaciones Espaciales affirm a desire for cooperation in space science research of mutual interest.

"The Comision, as part of its space science research program, plans to conduct studies in the fields of meteorology, ioncspheric physics, and cosmic ray detection, utilizing rocket soundings to extend existing ground-based and balloon research programs. The Comision's program contemplates the establishment of a scientific sounding rocket launch site. Looking toward a continuing cooperative program in the furtherance of this research, the two organizations agree to the following program:

"(1) Arrangements will be made for the accommodation of small numbers of Argentine scientists and technicians in NASA space science centers or U.S. universities as may be mutually deemed appropriate, for training and familiarization in areas related to the above-mentioned sounding rocket research program. Such arrangements will be made within the framework of existing NASA programs.

"(2) NASA will undertake to arrange for the visit to Argentina of U.S. scientists and technicians to advise in the execution of the Argentine program and to lecture on experimental aspects of sounding rocket research programs at such times and for such periods as may be compatible with both Argentine and U.S. program requirements.

"(3) The two organizations will exchange technical information on the planning and conduct of scientific sounding rocket programs. In addition, NASA will provide such technical films and other visual training aids related to space science as may be available.

"(4) NASA will supply examples of meteorological and/or ionospheric sounding rocket payloads as feasible for study and demonstration in Argentina.

"Anticipating mutual interest in the Comision's scientific experiments, NASA has expressed its readiness to:

"(1) Use its best offices to obtain for the Comision, on a loan basis, certain range instrumentation, assuming the Comision decides to utilize such equipment in its program. The costs of transportation, modification and operation of such equipment would be borne by the Comision.

"(2) Transfer small sounding rockets for the initial Comision launchings, assuming that rockets of the type appropriate for the Comision's program, when defined, are available."

- END -

NEWS RELEASE

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
1520 H STREET, NORTHWEST · WASHINGTON 25, D. C.
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FOR RELEASE: IMMEDIATE
June 23, 1961

RELEASE NO. 61-141

# NASA AWARDS SATURN TANKAGE CONTRACT

A contract for the production of six 105-inch diameter liquid oxygen tanks for the Saturn space booster was awarded today by NASA's Marshall Space Flight Center.

The 21-month contract, totalling about $660,000 was let to the Vought Astronautics Division, Chance Vought Corporation, Dallas, Texas. Delivery of the 56-foot long tanks will begin in April, 1962, and be completed in January, 1963.

Vought received a Marshall contract earlier this year for the production of forty-two 70-inch diameter fuel and liquid oxygen tanks for five Saturn boosters (NASA Release No. 61-40).

The Saturn S-I, or first stage, is composed of eight 70-inch diameter tanks -- four each for liquid oxygen and RP-1 (kerosene) fuel -- clustered around a 105-inch diameter tank. The unit will be powered by eight 188,000 pound thrust engines.

The first Saturn booster carrying two inert upper stages will be flight tested later this year. The early Saturn C-1 vehicle will be operational in 1964 and will be able to place ten-ton payloads in earth orbit.

Chance Vought was one of six firms submitting bids for this contract.

- END -

Canny

# NEWS RELEASE

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
1520 H STREET, NORTHWEST · WASHINGTON 25, D. C.
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FOR RELEASE: Saturday P.M.
July 1, 1961

RELEASE NO. 61-142

## MERCURY TRACKING NETWORK TEST PLANNED

The National Aeronautics and Space Administration is planning an orbital test of the recently completed worldwide Mercury tracking network.

Plans call for orbiting, late this summer, a 100-pound satellite containing transmitting and receiving equipment identical to that used in Mercury spacecraft.

The satellite will provide real-time calibration, training and operational experience for the new 16-station Mercury network, as well as an orbital flight test of Mercury communications gear.

The satellite is to be launched into an approximate 300-mile high orbit by a Scout vehicle, a four-stage solid propellant vehicle developed by NASA as an inexpensive multi-purpose space research booster. The vehicle to be used in this particular test will be fired from a Scout launching facility at Cape Canaveral, Fla., provided by the U. S. Air Force.

The satellite package and the booster are being prepared for flight by Aeronutronic (Division of Ford Motor Company) working with communications equipment provided by McDonnell Aircraft Corp., NASA's prime contractor for Mercury spacecraft production.

The satellite, to be called Mercury-Scout I, will be launched on the same orbital path Mercury capsules will follow.

- END -

RELEASE NO. 61-143

# U. S. COOPERATION IN SPACE RESEARCH

Arnold W. Frutkin
Director, Office of International Programs
National Aeronautics and Space Administration

When viewed against the long time scale of the future, it becomes apparent that all of us, from whatever nation, stand only at the threshhold of space research and exploration. Some of us have taken a step or two; others have yet to do so. But there is not so much distance between us that those in front cannot pull or those behind push. With some judicious pulling and pushing, the forward progress of all may be facilitated.

At least two considerations dominate in dictating such cooperation among the nations. One is the desire of men of good will to see that a pattern of peaceful purposes and methods characterizes our response to the infinite challenge of space. Second, those nations which recognize the costs of space activity to be beyond their individual scope nevertheless desire to pool their resources in order to share in the activity and keep abreast of the new technology.

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Presented at the European Symposium on Space Technology, London, England, June 28, 1961

The realization of both considerations is in the general interest. Promising efforts to advance both are underway in Europe. Many countries are already participating in the important efforts of the scientific community, through COSPAR, to carry forward, in space science, the valuable patterns of the International Geophysical Year. At its recent reunion in Florence, COSPAR laid the groundwork for major programs of space research in support of the broad planning of the scientific community for a World Magnetic Survey, for the International Year of the Quiet Sun, and for valuable Synoptic Soundings of the Upper Atmosphere.

Further, a regional effort is emerging within Europe to provide a multilateral operating agency which will carry out space research programs and, one may assume, lend support to the worldwide programs of COSPAR.

In the United States, considerations of a very similar character have, from the very beginning of our space research effort, prompted us to cast our own program in an international mold. When the Congress in 1958 established NASA as the new civilian space agency, it provided that --

"The aeronautical and space activities of the United States shall be conducted so as to contribute materially to cooperation by the United States with other nations and groups of nations in work done pursuant to this Act and in the peaceful applications of the results thereof..."

The objectives of the program are very simple: First, to contribute to the peaceful development of space research and exploration. Second, to enlist the constructive participation of scientists of other countries in the immense task of advancing man's knowledge and use of his spatial environment.

While the program itself is most flexible, which is only sensible in a new and rapidly developing field, considerable care has been given to shaping guidelines for its implementation. It may be useful here to review these guidelines:

-- First, as a technical agency, NASA is, of course interested in sound programs with valid scientific objectives. Other considerations which might come under the heading of general aid or support are more properly the concern of other agencies. The essential role of our own agency, it seems to us, is to inform, stimulate, complement or supplement the continuing programs which other countries wish to carry out in their own interest.

-- Second, it is necessary that we deal, for most purposes, with a single agency or group in a given country. As in our own country, there are a variety of interests in space activity: governmental and private, scientific and engineering, military and civilian, etc. Obviously NASA would not wish to become involved in internal issues. Our efforts are joined therefore with central groups suitably sponsored and adequately financed to sustain useful programs. Generally speaking this means that our cooperation is with government-sponsored or supported groups.

In the United Kingdom, for example, the joint space research program with NASA is conducted entirely with the British National Space Committee. Programs with Italy and France are in each case conducted with a single government-sponsored and -supported national space committee.

-- Third, we wish, to the extent possible, to ensure that cooperative programs measure up to their initial promise. To this end, we seek full understanding between technical staffs in advance of any broad, formal agreement. The scope, character, or magnitude of a given program may then require that it be formalized appropriately.

-- Fourth, it was decided early that a sound and enduring groundwork may be established if cooperative programs are carried out without an exchange of funds between nations. Instead, each nation funds that portion of a cooperative project which represents its own commitment of staff and material. The contributions need not be equivalent, but it is obvious in any case that each gains by reason of the other's effort.

-- Finally, in keeping with our own objectives and with scientific tradition everywhere, the results of joint projects should be made generally available to the scientific community.

Taking all of these considerations together -- substantive scientific projects, central sponsorship, self-support, full technical understanding, and the free exchange of scientific information -- we think they add up to a sound and realistic program for international cooperation with gain all around.

With the very great interest and hard work of other countries, we have been able to make considerable progress in pursuing the program which has been built upon the guidelines I have just discussed.

In March 1959, the U. S. National Academy of Sciences' delegate to COSPAR offered on behalf of NASA to place in orbit individual experiments or complete satellite payloads of mutual interest, prepared by scientists of other nations. Since then, NASA has affirmed and re-affirmed its readiness to make available launching vehicles, spacecraft, technical guidance, and laboratory support for useful experiments or payloads developed by foreign scientists. The launching vehicle provided (without cost) may be the Scout or another, as appropriate.

The first satellites in this program are already being prepared by the United Kingdom and Canada for launching by NASA sometime in 1962. The initial U.K. satellite will carry environmental experiments (cosmic rays, ion mass spectrum, electron desnity and temperature, and solar radiation) while the Canadian satellite will sound the ionosphere from above. An understanding with the French Space Committee looking toward a cooperative sounding rocket and satellite launching program was recently announced.

The preparation of total satellite packages by foreign groups may be assisted initially by NASA through the provision of structural, power, or telemetry elements, but it is expected that such groups will thereafter assume responsibility for these elements. The performance by the cooperating nations of a maximum of the preparatory work on their own experiments in all aspects of this program is clearly desirable.

It is important to note that the very closest working relationships are required for such projects because of the rigid design and test requirements necessary to assure mission, structural, and electronic compatibility between satellite and vehicle systems as well as among the various components of the satellite itself. Thus, in the joint satellite programs now in preparation with the United

Kingdom, working parties on each side are in constant communication and meet regularly as a joint working group to resolve, by mutual agreement, the numerous technical problems inherent in preparing actual space research systems. Precisely the same procedure is in effect in the Canadian program.

As payload capabilities increase materially in the next two years and payload design becomes more standardized, space for individual experiments -- as distinguished from complete satellite payloads -- should become available in the large orbiting astronomical or geophysical satellite observatories which are now being designed.

It will often be found desirable to test proposed satellite experiments in earlier flights in sounding rockets. Indeed, scientific work with various sounding rockets is useful not only in itself but also as a means for familiarizing technicians with many of the problems encountered in designing and adapting instrumentation for the conditions of space flight.

NASA encourages and assists in the development of sounding rocket programs by other countries and cooperates in the activities of foreign rocket teams which seek to contribute to the overall goals of space research, assuming again that the cooperating groups are willing to commit resources of their own to such work. In particular, NASA welcomes and encourages sounding rocket programs of synoptic value or of special geographic significance. The upper air experiments utilizing grenades and chemical reagents are especially suitable for the initial phases of new programs since they do not require the most complex optical or radio ground instrumentation.

In the continuing program of the Italian Space Committee, for example, a series of launchings was proposed to create sodium vapor clouds for the measurement of winds and temperatures in the high atmosphere. A successful test has already been conducted in Sardinia, followed by successful synoptic launchings from Sardinia and Wallops Island. In this program, the Italian Space Committee arranged for the necessary rockets, established the launching site and conducted the launchings, provided optical instrumentation to retrieve the data, and is reducing and analyzing the data. NASA sponsored the Italian purchase of rockets in the U.S., provided a basic launcher, and contributed the payload. Technical advice was also afforded.

In other bilateral programs NASA may, on the other hand, contribute the initial rocket vehicles while the cooperating nations provide the payloads. The mode of cooperation is, in other words, very flexible. In any event, it is perhaps to be expected that sounding rocket programs may make up a significant portion of international space activities, especially in countries in which available funds may limit more ambitious satellite projects. Such activities are of great potential scientific value since the restriction of sounding rockets to vertical profiles means that a multiplicity of efforts is required if comprehensive results are to be achieved. Certainly, small sounding rocket efforts should contribute economically to substantive advances in know-how in the fields of instrumentation and experimentation for space research.

A most constructive contribution to space research within the present capabilities of scientists abroad lies in supporting research conducted from the ground. A program of this type was arranged in connection with the utilization of Echo I and, with the cooperation of French and British facilities, resulted in the first transatlantic communications by means of an artificial satellite. In anticipation of further experimental intercontinental communications by satellite next year, NASA provided the specifications and plans for its communications satellite program to interested countries in Europe and elsewhere. As a result, major ground facilities will be erected and operated for these tests by the United Kingdom, France and perhaps additional countries.

Another extensive ground-support program was organized jointly with the U. S. Weather Bureau in connection with Tiros II; weather services in other countries were invited to conduct meteorological observations synchronized with the passes of the satellite and to analyze the data from both sources. Instrumentation difficulties restricted the program but a valuable organizational precedent was established and will be implemented again with the launching of Tiros III.

The ground-based program maximizes the scientific value of satellite programs by stimulating the gathering of important supplementary information and by greatly expanding the number of competent scientists attacking the sizable tasks of data analysis and correlation. Further, it engages foreign scientists in space-related activities, inspiring their continuing interest and imparting the knowledge necessary for further activity.

NASA overseas tracking and communications stations present a unique opportunity for cooperative efforts. Of about two dozen overseas facilities, in almost 20 different countries or localities, more than half already operate wholly or in part with the assistance of technicians of the host country. Indeed, the cost of operating several of the stations is fully borne by the cooperating countries. Increased technical participation in the operation of the global network is encouraged, and a training program for this purpose is underway.

Scientific communities entering into the new technology of space research may find their greatest need to be technical advice and experience. A postdoctoral program, funded by NASA and administered by the National Academy of Sciences, makes it possible for foreign as well as domestic scientists to pursue space-connected projects at NASA centers.

In a second and separate program, NASA offers laboratory support and training for extended periods to qualified scientists appropriately sponsored by their governments. The sponsoring government ordinarily meets travel and subsistence costs. Such laboratory support may be provided as part of a broader program in cooperation in space science. The possible fields of interest include vehicle and launch operations; payload design, packaging and testing; space science programs and theory; tracking, telemetry and communications; and data processing.

To ensure dissemination of scientific data resulting from space research, procedures are in force to provide for; dispatch of preliminary technical information to COSPAR upon the launching of rockets and satellites; regular transmittal of orbital elements and satellite observations through the international SPACEWARN system designated for that prupose; NASA support of the U. S. component of SPACEWARN; publication of preliminary scientific results and the deposit of results in the World Data Centers; agreements with experimenters to provide the results required; and publication, for world use, of telemetry calibrations where useful. These activities have as their background the exchange arrangements made during the IGY and continued since then.

I hope the foregoing brief description of NASA's international cooperative activities is indicative of a vigorous and productive program. Problems are, of course, encountered in all programs. The very long leadtime implicit in this most difficult of technologies means that cooperative projects can mature slowly at best. Time is required for any nation to decide to enter seriously into the new technology and to organize, finance and plan for the conduct of space research.

These prerequisites to cooperation are being met by individual nations. Now other efforts to mount cooperative assaults upon the unknowns in space are materializing. Both in Europe and in Latin America, multinational regional organizations are perfecting their characters and considering appropriate programs. The United States has welcomed these developments and made clear its willingness to enter into joint projects with the new organizations on the same flexible basis as with individual countries. Thus, the prospects for broad international cooperation in space research are multiplying.

It is to be hoped that this pattern will continue to expand so that it embraces all of the practitioners of space research and permits full exploitation of the intellectual and practical values of space science for all men.

Carney

# NEWS RELEASE


NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
1520 H STREET, NORTHWEST · WASHINGTON 25, D. C.
TELEPHONES: DUDLEY 2-6325 · EXECUTIVE 3-3260



RELEASE NO. 61-144

FOR RELEASE: Thursday AM
June 29, 1961


## APRIL CONTRACT AWARDS

The National Aeronautics and Space Administration awarded the following new contracts and research grants during April, 1961. The figures shown represent the total estimated cost of contracts of $50,000 or more let during the period.

### HEADQUARTERS
Washington, D. C.

University of Hawaii (Honolulu, Hawaii) -- $120,039 -- Research, in cooperation with the University of Colorado, on Zodiacal light selected lines in the airglow spectrum.

Leland Stanford Junior University (Stanford, California) -- $76,500 -- Basic studies on space vehicle attitude control systems.

University of Michigan (Ann Arbor, Michigan) -- $50,000 -- Research on the basic principles pertinent to the selection and metallurgical treatment of alloys for structural use in supersonic aircraft.

General Electric Company (Philadelphia, Pennsylvania) -- $75,622 -- Study and evaluate passive (inert shielding materials) and active (electrostatic and magnetic) radiation shielding systems, and carry out preliminary design studies of active shielding systems, to indicate means for reducing shielding weight requirements.

Sperry Gyroscope Company Division of Sperry Rand Corp. (Great Neck, N.Y.) -- $85,815 -- Research on an electrostatic technique for low-level acceleration measurement. This research will include theoretical study, computer analysis, and experimentation with a three-axis (scale) laboratory model. Research to be conducted generally in accordance with Contractor's proposal dated October, 1960.

University of California (Berkeley, California) -- $99,498 -- The Contractor will conduct research on low-energy cosmic radiation from the sun, including (a) design and development detection apparatus suitable for inclusion in EGO payloads; (b) provide NASA with one (1) prototype unit by April 1, 1962 and two (2) flight units by July 1, 1962; (c) analyze and interpret the resulting experimental data.

Wilmot Castle Co. (Rochester, N.Y.) -- $106,880 -- Contract to perform research on sterilization of space probe components by dry heat, irradiation, or other techniques.

University of Michigan (Ann Arbor, Michigan) -- $81,500 -- Research on the use of electronic and mechanical apparatus and instrumentation for rockets and satellites.

Armour Research Foundation, Illinois Institute of Technology (Chicago, Illinois) -- $75,000 -- Contract for research on the effects of solar plasma and electromagnetic radiation on thin films and surfaces.

Dept. of the Navy, Bureau of Medicine and Surgery (Wash., D.C.) -- $62,120 -- Conduct research into basic physiological mechanisms which defend the human body against heat and cold, and determine the extent and efficiency of energy transformations in the human body and in isolated body constituents at the molecular level.

Dept. of the Navy, U.S. Naval Research Laboratory (Wash., D.C.) -- $90,000 -- Conduct measurement of the optical constants of materials in the extreme ultra-violet, including construction of a reflectometer for use with existing vacuum monochromators.

## LANGLEY RESEARCH CENTER
Hampton, Va.

U.S. Naval Ordnance Test Station (China Lake, California) -- $81,500 -- Motors, Rocket Spherical NOTS 100-B.

Compudyne Corp. (Hatboro, Pennsylvania) -- $74,580 -- S/M designing, furnishing and installing Airstream Oscillating System Bldg. #198, Transonic Dynamics Tunnel.

Lance J. Eller, Inc. (Keller, Virginia) -- $63,475 -- Widening roadway extension and resurfacing old road.

Chicago Bridge and Iron Co. (Philadelphia, Pennsylvania) -- $86,340 -- S/M for modifying, erecting and testing a vacuum sphere to Bldg. 1251.

## LEWIS RESEARCH CENTER
Cleveland, Ohio

Westinghouse Electric Corp. (Cleveland, Ohio) -- $75,000 -- Research study for heating hydrogen gas with an electric arc heater at Lewis.

Jerrold Electronics Corp. (Philadelphia, Pennsylvania) -- $58,924 -- Installation of a power control and communication pole line at Lewis Research Center.

Harvey Wells Corp. (Framingham, Massachusetts) -- $75,000 -- Electromagnet and power supply.

Varian Associates Instrument Division, (Palo Alto, Calif.) -- $52,327 -- Spectrometry system for Lewis Research Center.

Nuclear Development Corp. of America (White Plains, New York) -- $533,445 -- Liquid metal heat transfer system.

Aerojet-General Corp. (Azusa, California) -- $99,326 -- Rocket engines.

## GODDARD SPACE FLIGHT CENTER
Greenbelt, Md.

Watkins-Johnson Co. (Palo Alto, Calif.) -- $55,291 -- Ultra low-noise traveling-wave amplifier, solenoid and power supply.

Aerojet-General Corp. (Azusa, California) -- $109,681 -- Research study to determine propulsion requirement systems for space missions.

Electro-Mechanical Research, Inc. (Sarasota, Florida) -- $93,910 -- Telemetry encoders for the UK #1 Scout satellite.

Hughes Aircraft Co. (Culver City, California) -- $79,034 -- Basic research study on avalanche phenomena in semi conductors.

Inland Testing Laboratories, Cook Technological Center, Cook Elec. Co. (Morton Grove, Illinois) -- $50,000 -- Development of nickel-cadmium storage batteries.

Ampex Instrumentation Products Co. (Redwood City, California) -- $113,175 -- Three (3) magnetic tape recorder/reproducers.

Rocketdyne Division, North American Aviation, (Canoga Park, Calif.,) -- $97,686 -- Research study to determine propulsion requirement systems for space missions.

National Bureau of Standards (Wash., D.C.) -- $50,000 -- Funding to support in part the NBS program for the development of radiometric standards in ultraviolet and soft X-ray spectral regions.

## MARSHALL SPACE FLIGHT CENTER
Huntsville, Ala.

The Bendix Corp. (Teterboro, N.J.) -- $100,756 -- Engineering and fabrication services.

Vought Astronautics Division, Chance Vought Corp. (Dallas, Texas) -- $500,000 -- 70" Containers, oxidizer and fuel for S-1 vehicle (Saturn).

Parker Hannifin Corp., Parker Aircraft Co. (Los Angeles, Calif.) -- $194,487 -- Research and development of Saturn booster preliminary and fill and drain valves.

Narmco Industries Inc. (San Diego, Calif.,) -- $59,703 -- Development of adhesives for very low temperature application.

Redstone Arsenal Exchange (Redstone Arsenal, Ala.) -- $108,000 -- Contract with Thiokol Chemical Corp. modification to the M-60 rocket motor.

Arnold Air Force Station, Arnold Engineering Development Center, (Arnold Air Force Station, Tenn.) -- $100,000 -- Provide 5 days of testing time in the propulsion wind tunnel facility to consist of approximately 25 shots at Mach numbers .7 to 1.5.

Air Products, Inc. (Allentown, Penn.,) -- $349,687 -- Design, documentation and liaison services for a liquid hydrogen transfer and storage system.

Cryo-Sonics Inc. (Los Angeles, Calif.,) -- $81,427 -- Unit, pump and vaporized liquid nitrogen, skid mounted -- 2 each.

Texas Instruments, Inc. (Dallas, Texas) -- $151,800 -- Amplifiers -- 200 each.

Trans Sonics Inc. (Lexington, Mass.) -- $56,500 -- Thermometers.

Convair Astronautics, General Dynamics Corp. (San Diego, Calif.,) -- $53,322 -- Study of orbit launched vehicles.

Ampex Corp. (Atlanta, Ga.,) -- $91,750 -- Tape Recorder.

Convair Astronautics, General Dynamics Corp. (San Diego, Calif.,) -- $80,232 -- Research and development in prevention of corrosion of metals used in the Saturn space vehicle.

Chrysler Corp., Missile Division (Detroit, Mich.,) -- $58,492 -- Investigation of the age deterioration of lubricants subsequent to storage on launch vehicle valves.

A. E. Burgess Co., Inc. (Birmingham, Ala.,) -- $108,333 -- Paving, grading and drainage for addition to building 4708.

Cornell Aeronautical Lab., Inc., (Buffalo, N.Y.) -- $180,000 -- Research relative to the development of equipment for acquiring high resolution measurements of wind velocity and vertical wind shear in the troposphere.

\- END -

Canney

# NEWS RELEASE

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
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FOR RELEASE: IMMEDIATE
June 29, 1961

RELEASE NO. 61-145

## NASA AWARDS CONTRACT FOR SPACE RADIATORS

The National Aeronautics and Space Administration has awarded a $589,000 contract for construction of a test stand at the Lewis Research Center, Cleveland, for development of space radiators and condensers.

The contract was awarded to Pratt & Whitney's Connecticut Aircraft and Nuclear Engine Laboratory (CANEL) at Middletown, Conn.

Purpose of developing a space radiator and condenser is to provide a means of dissipating heat generated in producing electric power for space applications. These applications include electric power for ion propulsion engines and auxiliary electrical power to run spacecraft instrumentation.

The test stand will be designed, built and checked out by CANEL. It is to be installed in the Engine Research Building at Lewis.

The stand will include a space environment chamber eight feet in diameter and 18 feet long, instrumentation and a closed-loop system for the flow of liquid metal coolant capable of dissipating heat up to 1,800 F.

The contract calls for the work to be completed in 15 months.

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